

SF

395

L6

UC-NRLF



\$B 34 021

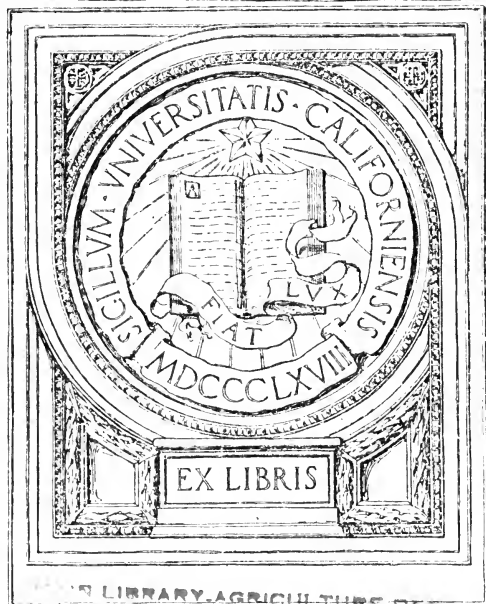
Hogs

By A. J. Lovejoy

With Supplementary
Chapters on Feeding

by
John M. Evvard

GIFT OF
Agricultural Educ.Div.



Hogs

By A. J. Lovejoy

With Supplementary
Chapters on Feeding
by
John M. Evvard

A PRACTICAL BOOK FOR
THE PURE BRED SWINE
BREEDER AND FARMER

Chicago
The Frost Publishing Co.
1919

MAIN LIBRARY-AGRICULTURE DEPT.

SF 395

L6



A. J. LOVEJOY

INTRODUCTION

THE author has not undertaken to write a thesis, but having commenced the business of swine breeding when quite a young man and following it for practically forty years, he has been requested to write this book along practical lines.

Beginning with a pair of young pigs many years ago, the only way anything concerning the subject has been learned has been by actual experience. This experience has been costly, but what is learned at the greatest expense one never forgets.

For many years the writer did all his own work in the business of swine breeding and feeding as well as showing. He gained in knowledge as he gained in experience. I cannot recall any labor or duties connected with the feeding and breeding of swine that I have not carried on personally, and step by step grown in the business from the smallest possible beginning until a trade has been built up that extends throughout the United States and into foreign countries. Being of a temperament that never gives up, and with a determination to stick to the business through thick and thin, I have never wavered from my determination to make it a success and a permanent business.

Early I decided to follow the purebred business, selling principally to breeders, and feeding for market hogs that did not come up to a standard of excellence necessary to satisfy customers. I have never had any reason to change my first decision. Of course, in the early days it was a hard matter to find customers, but good care, feeding and advertising and the following of the showing, gradually brought us to the attention of farmers and breeders, and as the years came and went I could see a gradual increase of business and of knowledge regarding it, and each year I went out a little stronger in the showing, did a little more business over the circuit and found a larger correspondence at home; all of which was gratifying and encouraging. It was my good fortune also to believe in system in all things, and to system I attribute much of my success later.

Careful records were kept of all animals—breeding dates, farrowing dates, marking of the litters, and disposition of the same, showing to whom sold and prices received; correct accounts regarding expenses and receipts, making a thorough system of book-keeping. It has always been our custom promptly to answer all correspondence, keeping a carbon copy of the reply to every letter. Before typewriters were used, all letters were written with a pen, and a letter press was used in taking an impression in the copy book. It is no trouble for us today to turn to any year's business, or to find out, if the question is asked, what animal we sold to a certain man years ago.

Nothing has ever been done on this farm in the matter of breeding but is on record; therefore we do not depend on our memory for anything connected with the business.

What I have learned during these many years of close contact with the business is written out in this book. I hope that many a young man, new in the business, or perhaps the older man of experience, may find some fact or view that will interest and help him. It is for the benefit of my fellow-breeders, feeders and farmers that I have attempted to write it, and it was with great diffidence that I undertook it, even after urgent solicitation, and I only trust that it may meet with the approval of those who are striving to make a success of the swine business.

In advising a beginner I can only say: Select the breed that you think you would like best, no matter what color. After fully deciding with which one you will begin, stick to it, and do not let anything cause you to waver. You cannot make a success by using first one breed and then another. Stick to the one you have selected, and by every means possible get all available information regarding it. Be honest, and remember that it takes time to build up a business, and after it is once established one must be as careful to maintain it as he was in building it.



What is there about the farm more interesting than a bunch of good hogs?

PART 1

CHAPTER I

THE IDEAL HOG FARM.

The writer has never seen an ideal hog farm in every respect. While many farms are almost ideal, usually they lack something. My idea of an ideal hog farm is that it should first have a rich soil, full of fertility to grow grasses and other forage, as well as the grains needed for the best feeds for the proper development of hogs. After a good rich soil, the next thing is a slightly rolling well-drained farm. If it is underlaid three or four feet with gravel, as much of our soil in northern Illinois is, it will not require tiling to carry off surplus water. I have often noticed that a farm that lies quite level, and has a rich black soil, gets very muddy after rains and during the coming out of the frost in the spring. This kind of soil is not best for ideal hograising; besides, being extremely muddy at times, this class of soil does not come as near being ideal as a dark sandy loam, well-drained with underground natural drainage. Such soil is also better even during dry weather for the feet of pigs. They are rather more inclined to keep in shape and wear down a little all the time instead of growing long and turning up at the toes, as do many pigs kept on soft, mucky black soil.

If one wishes a central hoghouse for general use, rather than a feedhouse and half-acre lots in which individual houses are placed, he should place his central house where pastures can be easily reached from either side. The kind of house he should use is one of the modern swine houses, described on page 12. It should be situated so that a good pasture of well-set grass or mixture of grasses can be reached from either side. Pastures before being occupied in this manner should be well-set in grass at least a year before being used as hog pasture.

A small pen the same width as those on the inside of the hoghouse should extend outward from the pen 16 or more feet, just for convenience, and gates opening from these to the regular pasture, which may be acre lots, half-acre lots or much larger, according to whether the breeder cares to keep each sow and litter separate after they go on grass. If half-acre lots are used, each should have a sleeping house at the rear end, and artificial shade, if there is not natural shade in each lot, for the comfort of the sow and litter during hot weather. They should come to the general house for feeding.

Forage Crop Mixture.—A mixture of clover, alfalfa, orchard grass and other grasses makes ideal pasture. The lots should be situated on either side of the general hoghouse. Arrangements for

watering should be made so that all can drink from the central house. Small fields of forage should be grown where a large number of sows or young hogs may be placed after weaning time, or those that have already weaned their litters, or animals being fitted for market that would not necessarily be obliged to remain in the central house and lot, but could run in the larger lots and larger numbers together. I quote the following on the value of forage crops for swine from Bulletins Nos. 136 and 143, from the Iowa Experiment Station:

"Probably there is no kind of pasture that becomes green and suitable for hogs as early in the season as a field of winter rye, sown early in the fall previous. This rye often furnishes good grazing through the late fall and early winter, or until it becomes covered with snow, then it is the first thing that will furnish a green bite in the spring, coming on much earlier than either alfalfa or clover.

"Following the early rye comes alfalfa, which furnishes green pasture a little earlier than any of the clovers. By May 1 in the northern latitude red clover will furnish a splendid pasture until such time as it begins to dry and burn by the hot weather. By this time a field of rape should be ready; it is probably as good pasture for making growth and gains as any other one kind of green forage. This should be sown in May and the pigs should be kept off of it until it becomes a few inches high, after which it will stand extremely heavy pasturing.

"Where one wishes to hog down corn in the fall by turning in a large number to fatten for market, there is nothing that will combine with this as well as Dwarf Essex rape, drilled in between the rows just after the last cultivation of corn. By the time the corn is ready to turn the hogs on you have an ideal ration in the same field; or rye sown with the rape also makes a good combination."

No greater opportunity exists for cheapening pork production than through the general adoption of a forage crop system for spring pigs. Where alfalfa pasture is used in this climate it should not be pastured earlier than May 1 nor later than November, as it must have enough growth after pasturing to make a cover crop for the winter. Where rape pasture is used it will be found good at any time during the growing season and furnish abundant pasture after the clovers are dry and dead; in fact will furnish good pasture until freezing weather comes. It can be used either for pasturing or for soiling, that is, cutting and carrying to the lot where the pigs are kept if they are not turned into the field.

Young hogs can be pushed very fast by having this good rape pasture and ear corn, plus one-tenth of the corn in meat meal or best quality tankage. This meatmeal or tankage is a great help in furnishing the necessary protein and has a tendency to stop the inclination for rooting that many pigs have when on clover or alfalfa.

In Winter Quarters.—When hogs and pigs are in winter quarters with no succulent feed such as pasture, the other feeds may be supplemented by using a good quality of third cutting alfalfa which is greener and better than that of former cuttings. This may be fed whole in racks made for the purpose to save waste, or it may be run through a cutting machine and chaffed, and then mixed 2 parts chaffed alfalfa, one part shelled corn and one part

oats, thoroughly mixed and ground through a steel burr grinder, which is better than any other for this kind of a mixture. If desired a little middlings may be added and a little tankage to make a balanced ration and a complete one. This may be fed dry in troughs where there would be no waste, or can be steamed a little and thoroughly mixed so that all particles of ground feed and alfalfa are well mixed. This makes an ideal feed in the winter for brood sows or growing sows. A little of it for fall pigs is good but they should also have a feed once or twice a day of a warm slop containing skimmed milk if possible, or enough tankage to balance the other materials.

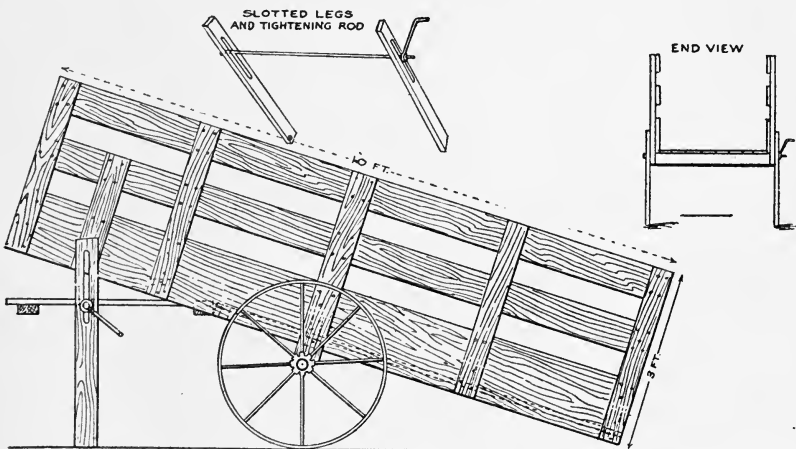
Location.—Further along the line of the ideal hog farm, I wish to say that this farm should be located as near as possible to a good shipping point or on an Interurban line leading to some city where one or more railroads enter, the more the better. It should also be located on a good hard road rather than on muddy lanes or steep hills, so that pigs could be delivered at any time during the year rain or shine. It should also have some portion of the farm covered with a nice growth of trees where dry sows and young hogs could be carried along on good pasture between breeding seasons. This pasture for best results should have springs or running water of some kind, but springs would be preferable rather than a stream running through the farm. The farm should be large enough to furnish all the grain and feed that would be used in the business, as well as straw to make first-class bedding, and fields should all be rather small, say from 10 to 20 acres each and all fences, both outside and division, should be made of woven wire with steel or cement posts, so that when once built there would be no need of repairing for a generation. Suitable gates made of galvanized piping with woven wire should open into every field and pasture. These gates should not be less than 14 feet wide, so that teams could be driven in and out when necessary. Suitable barns, nicely painted and kept in good repair, should be of sufficient number to contain all the products of the farm, both grain, hay and straw. A small building used as a shop should by all means be on every well regulated breeding farm, where crates, hurdles and anything along these lines could be made as needed. This shop should be furnished with a complete set of tools, including carpenters tools, pump, tongs, various kinds of wrenches and all such tools as are constantly needed on a farm.

Shop Equipment.—If the owner has any knowledge of blacksmithing a portable forge, and a drilling outfit should also be in the shop. Also a good heating stove so that work could be done here in cold or stormy weather. If the business was large enough to justify, a nice small office should be on every breeding farm, so that all comers would have a place where they could go and "talk hog" to their heart's content without being obliged to do this in the dwelling. All buildings should be built of good material, nicely painted and always kept in good condition. The various hog houses, as well as the smaller individual ones should all be nicely

made of lumber and well painted and each should be numbered. A plat of the farm proper should also be made by a surveyor and each field numbered, so that a regular record can be kept of what each field produced and what its crop rotation should be each year. All convenient utensils should be kept on every swine breeding farm such as mixing vat, steam boiler or water heater, good well made galvanized pails and dippers, a set of scales in the feed house or some other convenient barn where pigs and feed for them can be weighed, so that one could keep his feed account and know how much feed he was giving each different lot of pigs or hogs. Water should be in every feed house, either pumped directly with windmill or engine or from a compressed air water system. A low down wagon should be had, with the bottom not over 12 or 14 inches above the ground large enough to hold three to five barrels, or in lieu of this a galvanized tank made to set on the wagon, with about 4 compartments holding a barrel or more each, with covers strongly hinged with iron hinges to cover openings, so there would be no slopping from the tank when hauled from yard to yard or from field to field. Feed house should be so arranged that this wagon could be driven into it, where feed and water could be mixed and where the steam could be turned into the feed in cold weather if desired.

If a central hog house is used a system of ventilation should be arranged so that the walls would not be covered with dampness or ice during cold weather.

A chute for loading pigs into wagon or into crates set on a platform wagon should be made and set on a pair of wheels, so that it would almost balance and could be wheeled from one place to another, a picture of which is shown herewith.



Chute for Loading Hogs Into Wagon or Crate

This will be found much more convenient than to lift the crate from the ground whenever you wish to load a hog. A small pen in the swine house or other place where water is convenient should be made with a cement floor and outlet to sewer, where pigs could be sprayed or washed and cleaned ready for shipment. Pigs should always, especially during the warmer months, be nice and clean before being crated for shipment. In fact everything about the farm of the breeder should be attractive in appearance and general arrangement.

Pigs about the same age and size should always be yarded or pastured together, as they show to much better advantage; in other words the herd should be divided up in as even bunches as possible, all yearlings together, under year sows or boars in separate yards each, early spring pigs and late ones in separate yards, and so on all along the line. It makes a better impression on a visitor than to see all ages and sizes running together.



CHAPTER II

A COMPLETE SWINE HOUSE

Where one is raising hogs on a large scale and does not have to skimp for money to build proper buildings, the building known as the Myers plan, Plate I, is probably the most convenient swine house, with pasture and house attached, that could be built. The swine house proper is built in a circle 87 ft. in diameter with 20 pens around the outer circle, each pen being 13 ft. front by 12 ft. in depth and each opening to a one-half acre pasture, as shown in ground plan of building and pastures, Plate II, with the sleeping house at rear end of each lot, with additional larger pastures opening out from each of these half-acre ones. You will notice also

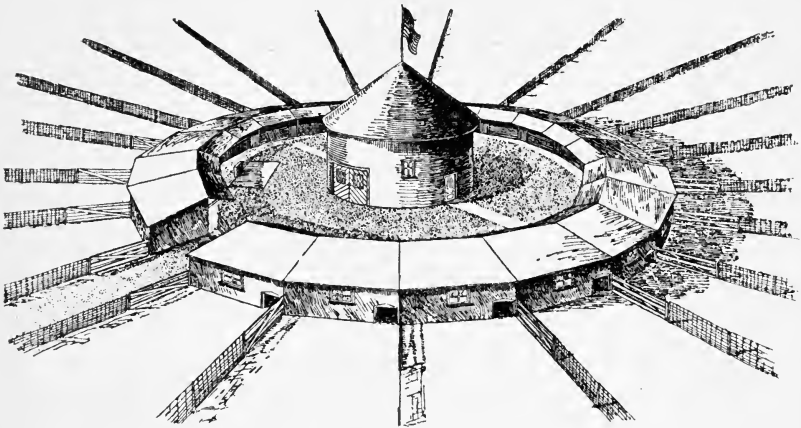


PLATE I. Myers Plan Hog House

by the ground plan that each half-acre lot has artificial shade along the fence between each two lots, thus accommodating the pigs in each yard.

The house, proper, which stands in the center of the circle, is 30 ft. in diameter, with feed bins around the circle, Plate IV. This part should be made with all concrete floor. You will notice an alley out each side of this feed house. Inside is located a hydrant or pump with a drain which runs to a sewer. A steel overhead track with carrier should be used in this building to carry the feed out to the cement walk around the front of the feeding pens, thus making a very convenient way of feeding, requiring no heavy lifting to feed in a trough, as shown in the side view. These

troughs should be made of cast iron or boiler iron. I would suggest in making these houses that a good article of prepared roofing other than galvanized iron be used. Galvanized iron draws too much heat, and another thing: it would have to be painted every year or it would soon rust out. A wagon scale should be located

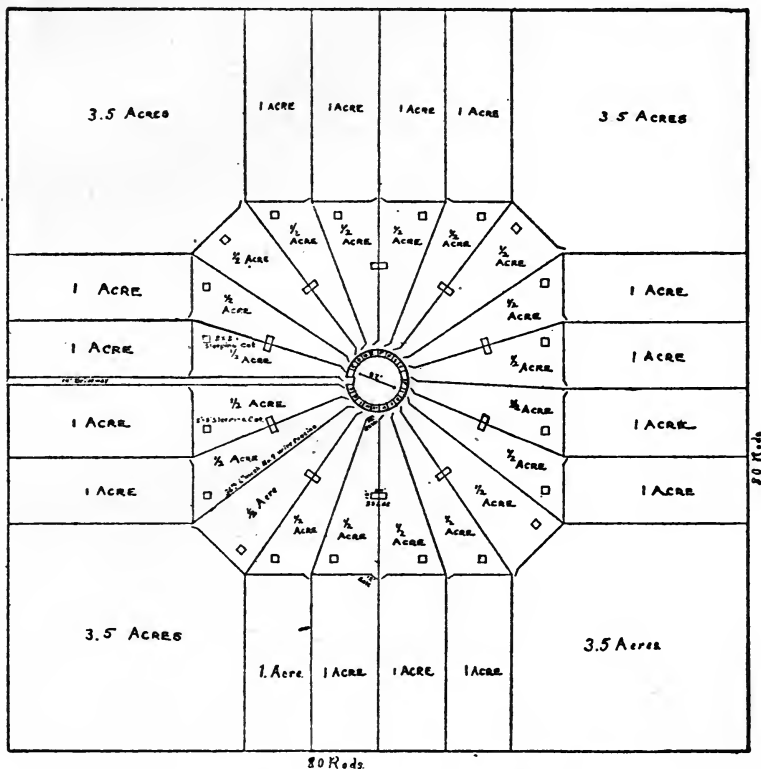


PLATE II. Ground Plan of Pastures

in the circle outside of the feed house, this circle being 24 ft. 5 in. in width between the concrete walk and the feed house all the way around and should be filled with cinders or gravel. This style of house would be a delightful place to work in and care for the herd, as one would never have to be out in the weather during summer or winter. All feeding would be done on a concrete floor, and the pigs could go out and in from the feeding floor to the pastures or sleeping quarters at will. I strongly recommend this house where a breeder has a large enough herd and business to justify it. It would require about 40 acres of land for the entire

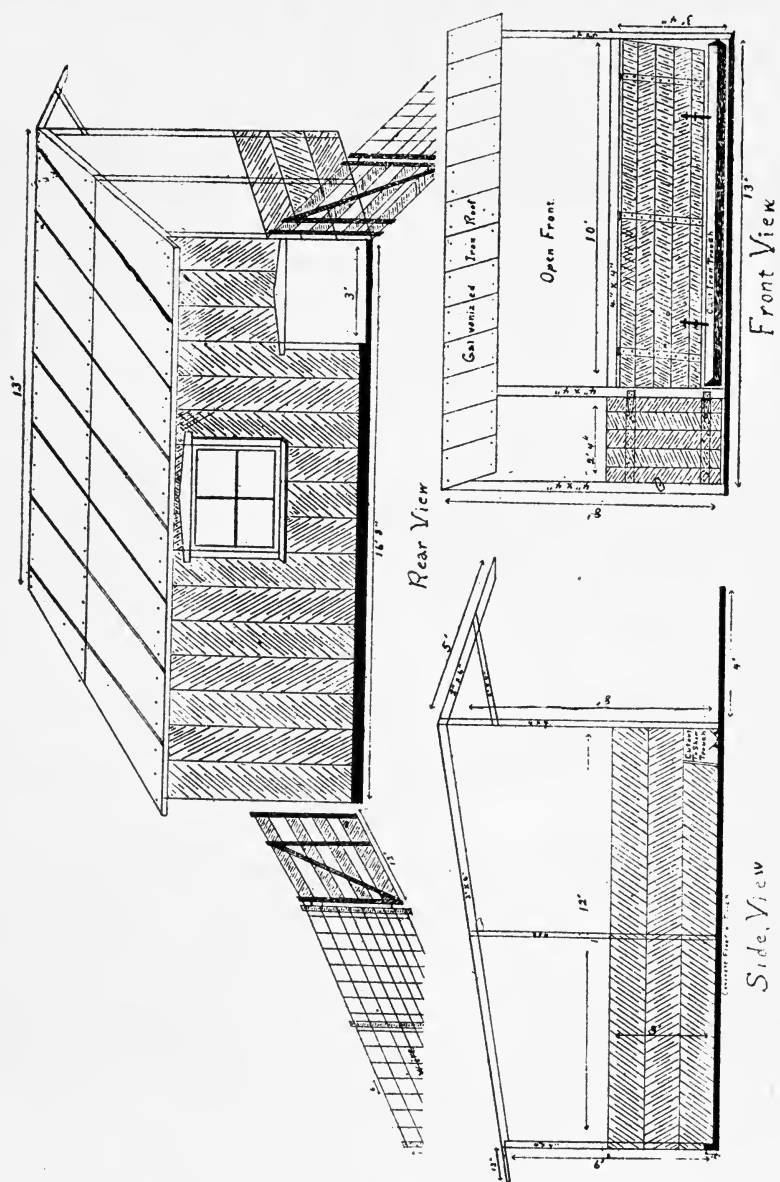
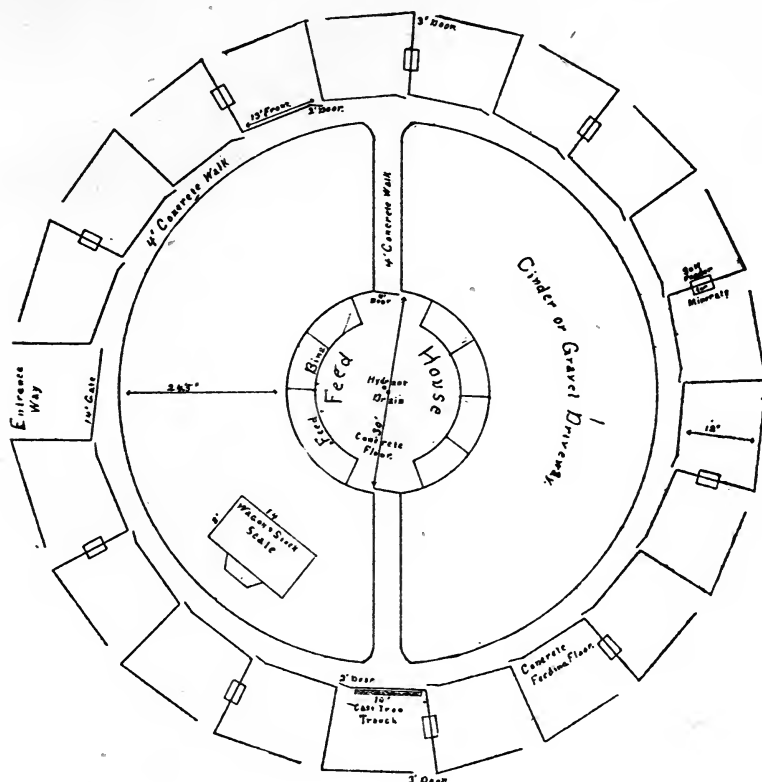


PLATE III. Sectional View of the Myers Swine House

plant. The land should be well-set in clover, alfalfa and other grasses before being occupied. To make an extra nice job, the yards could all be fenced with what is known as the galvanized hollow iron post, about 2 in. in diameter, which should be made 5 ft. in length and driven into the ground and the woven wire



Feed House and Feeding Pens For Swine (Ground Plan)

PLATE IV

fence attached with proper brace, etc. These posts usually come in 7 ft. lengths and cost around 30c each, but could be made 2 ft. shorter and driven into the ground 2 ft., which would leave them only 3 ft. above ground, which with a 33 in. woven wire fence would make a handsome job. They will last almost as long as cement posts; have little slots cut in them to hold each wire, which can be closed with a hammer after the wire is entered.

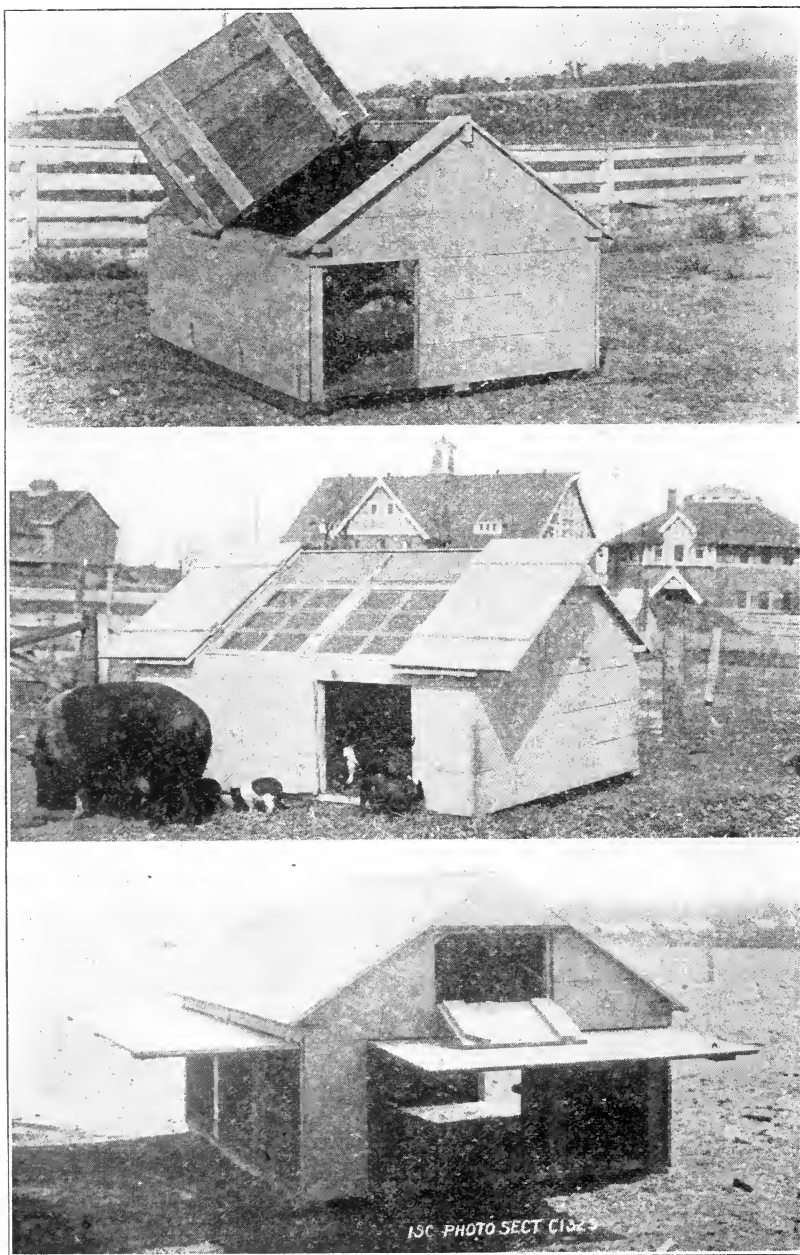


PLATE V. Some Types of Movable Hog Houses, Built at Iowa State College.
Photos Courtesy Animal Husbandry Department, Iowa State College of Agriculture.

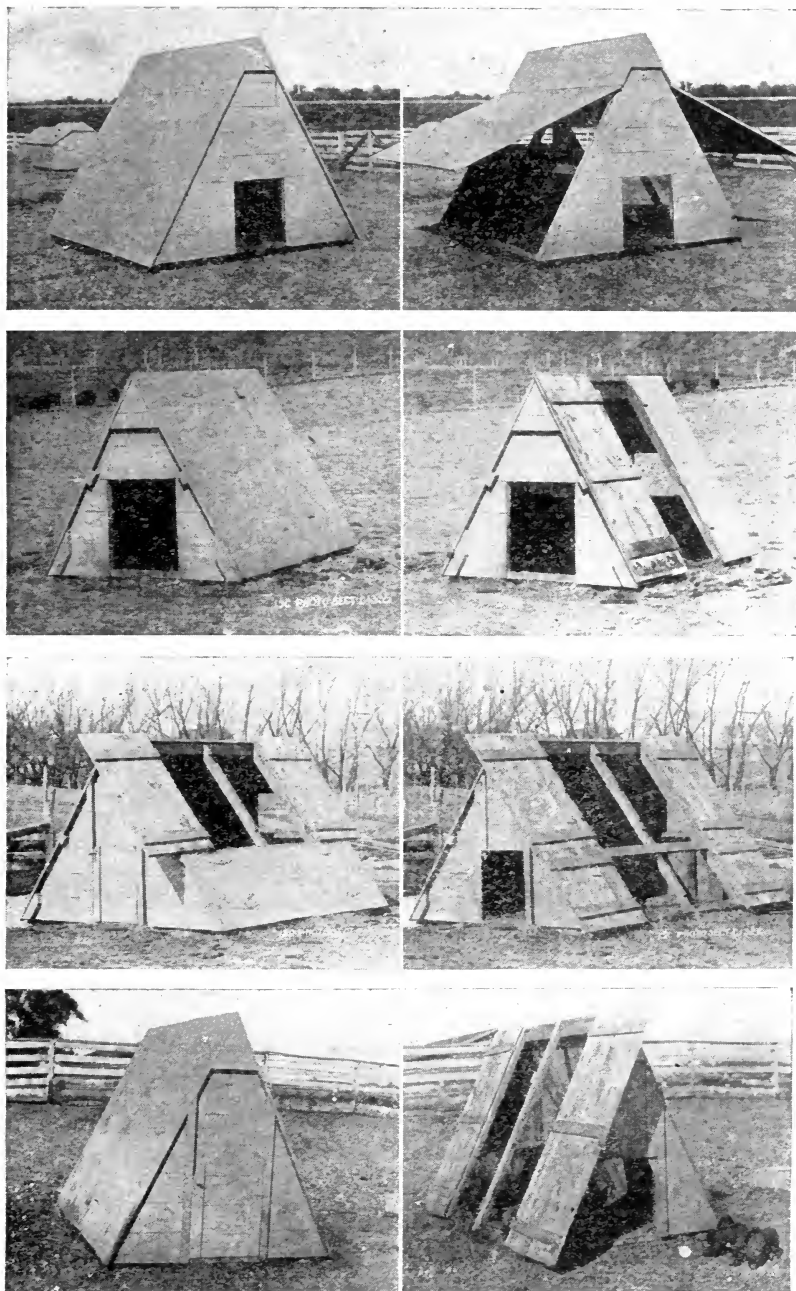


PLATE VI. Some Types of Movable Hog Houses Built at the Iowa State College.
Photos Courtesy Animal Husbandry Department, Iowa State College of Agriculture.

CHAPTER III

IMPORTANCE OF GOOD PASTURE

In forty years' experience I have come to the conclusion that many breeders and growers of swine, whether for the purebred trade or the market, fail to appreciate the importance of good pasture at all times, and the use of succulent feeds at such times and in such parts of the country where snow or cold weather prevents pasture during a portion of the year.

Probably there is nothing more desirable as a pasture for pigs than some one of the clovers. Of course different states and different parts of the country grow different kinds of grasses, and the hograiser should select such clovers or grasses as may be adapted to his locality. I would name the common red clover first. While



Pigs in Clover

no better than alfalfa, it will stand tramping and close cropping better. Of course the clovers in the colder states are not ready for the pigs quite as early as are some other kinds of green feed. Where this is the case, nothing is better than an early sowed field of winter rye that had a fair start the fall previous and also has been used as pasture when not covered with snow. This grain is the earliest to form a good green bite in the early spring, and will give an abundance of good pasture until such time as the clovers or alfalfa are of proper growth.

It is generally acknowledged that while alfalfa is a splendid pasture, it will not stand close grazing, and it will die out sooner than other grasses; for this reason we have always kept our hogs off the alfalfa fields, and especially should this be done during the winter.

Rape Valuable.—If there is any prospect in the spring of the pasture lot becoming short or danger of its becoming injured by dry weather, it is desirable to prepare for this emergency by sowing a field of dwarf essex rape, which is the best substitute for clover or alfalfa that I know of. In fact, every hograiser should sow a field of rape, as it is one of the best of all hog feeds. This should be sown as early in the spring as possible after the ground becomes warm, and should not be used as a pasture until it is six inches or more in height. After it once has a good start the pigs will never be able to keep it down, and this feed is good as a pasture feed even until freezing weather comes in the fall, and during the months of July and August when all other kinds of green food are withering and dried out this will furnish a very satisfactory green feed.

We have fed more or less rape for years and have never had anything but good results. Occasionally I have read of some trouble with the pigs becoming scabby or sore about the ears and parts of the body that come in contact with the rape; especially when there was a dew or slight rain, making the leaves wet. I understand, however, this trouble occurs only with the white breed of hogs; their skin seems a little more sensitive and inclined to blister in the sun, especially if wet.

An acre or two of rape, if a good stand and on good soil, will produce a surprising amount of first-class pasture. If it is desirable to sow a spring grain to be used before rape could become the proper size for grazing, a mixture of barley and oats and even field peas makes a desirable mixture to sow. I believe a hog prefers green barley sown early in the spring to any of the other varieties of spring-sown grain. Why this is I cannot explain, but if a patch of oats and another of barley are sown early in the spring, side by side, and pigs turned into the two lots when grain is a few inches high, they will eat the barley all off and give little attention to the oats, probably for the reason that the barley is more palatable.

Shade—Natural or Artificial?—The question of shade in the pastures or lots where pigs are kept during the summer, is of great importance. The pig being an animal that does not perspire, of course can not stand excessive heat and must have shade or suffer the consequences.

Where the hog pastures can be arranged in a wooded lot, that is all that can be desired. Where such is not the case artificial shade of some kind must be furnished. In lots on open, sunny land where there are no trees, very satisfactory arrangement for shade can be had by setting posts along the division fence every sixteen feet with corresponding posts eight feet each side of the fence, about four or five feet high along the fence with the outer ones about two and a half feet high, thus forming a covered place sixteen feet square with the roof slightly sloping to the east and to the west, or even each of the four ways. The cover should be of

good lumber and the ends of the boards projecting well over to prevent the sun shining under. This place should have no floor, and the ground after being used will naturally become rooted up and often gets very dusty; this condition can be overcome by one or two liberal sprayings of crude oil, and in extremely hot weather if the pigs suffer with heat, water can be thrown on the ground under the shades each day.

Where many hogs are pastured in a large lot of several acres or more, and there is no natural shade, a long shed can be built with the sides left open for about two feet above the ground. This should also be kept free from dust in the above manner and well ventilated, and as dark as possible during the hot, dry weather when flies are troublesome. But no shade equals that of a good tree with spreading branches in a woods pasture well set in white clover and bluegrass. However, I do not recommend the use of a thickly set underbrush or where the trees are so close together that the sun cannot penetrate to all parts some time during the day. Avoid such a place, as the direct rays of the sun are necessary for complete sanitation.

CHAPTER IV

NECESSITY OF PLENTY OF PURE WATER

The question of water for swine at all times is one that I fear is not looked upon with as much importance as it should be. For instance, many feeders—men who are really good feeders, too—seem to think that when feeding pigs or older animals on a mixture of wet feeds, containing more or less water, the animal is getting all the water it requires in eating a half pail or more of nicely mixed wet feed. To prove that this is not the case generally, let the feeder pour a little pure water into a separate trough and nine times out of ten the pig will take a drink of it while he is eating his wet feed. Of course it is sometimes rather discouraging to water a large number of hogs in separate troughs, and an hour or so after they have been fed a wet feed notice that in several of the lots or yards some of the pigs do not seem to drink any of it, but just remember some of them will drink heartily. For this reason it is far better, where possible, that a drinking fountain should be used where the pigs or hogs can go at will; this, of course, where there is no natural spring or water flowing through the yards or pasture lots.

I know personally that I drink and enjoy lots of good cold water, and while it is claimed by some that the drinking of water during the meal is injurious, I have always drunk all the cold water—and it is never too cold—with my meal that I wanted. I am now much over three score years and still drink water, and have never felt any ill results, and weigh over 250 pounds. I have an attractive stenographer who is helping me on this book—and a great help, too—who never drinks any water to speak of. She weighs 106 pounds, although not three score and ten, but I wish you to note the difference in weight, and that water is a valuable thing for producing flesh as well as satisfying a normal thirst.

Systems of Watering.—There are many ways of furnishing water to the herd. If many are allowed to pasture together or are yarded in the same winter quarters, it is an easy matter by having self-watering fountains, as it would be necessary for only one such fountain to be used in a covered shed or place where forty to fifty animals were daily allowed to congregate. Where animals are kept, as has been our custom, in yards with only a few in each, it is quite a serious matter, as each lot must either have a drinking fountain, or the animals must be regularly watered each day, and during the cold winter months no water must be left over night in the trough to freeze. We have a self-watering fountain which is connected with a forty-barrel supply tank so arranged that a lamp can be safely set under the drinking cup and fountain, always keeping the water warm. This is a very

desirable fountain, but could not be used where there were forty or more lots with a few pigs in each, unless there was a regular system of water pipes running along through these lots, and the cost would be so great that it could hardly be afforded; hence, outside of our one or two adjoining large lots, we are obliged during the extremely cold months to water each individual lot with water that has been warmed. In southern states it is probably not necessary to use water that has had the chill taken off—which is a much more desirable condition.

There are other watering fountains on the market for use during the extremely cold weather, arranged with a firebox for heating the reservoir above, with openings along the drinking tank on either side. In the case of breeders who use a central hog house, a pipe running along the troughs on either side of the alley and back to the water heater is very convenient to keep the chill off the drinking water, but these are not common. It is a small matter in *what way* water is furnished daily to every hog and pig on the farm, but it is of *much importance that it be furnished in some way*.

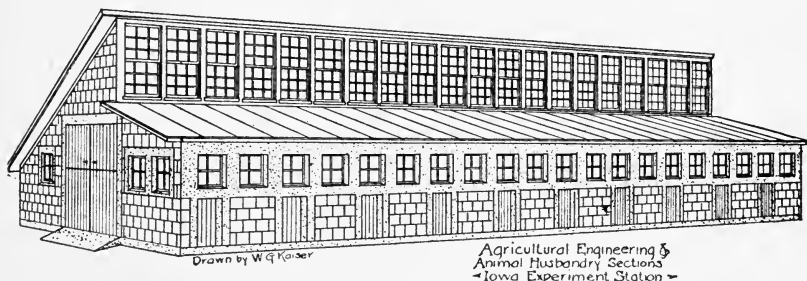


PLATE VII. A Half-monitor Roof Type of Community Hog House, Hollow Tile or Brick Construction

CHAPTER V

IMPORTANCE OF A GOOD SIRE

It is an old maxim that "a good sire is half the herd." If a poor sire, he is all the herd, and that means failure. Whether this is true or not, it is of great importance that the sire at the head of the herd should be a good one, not only individually, but what is more, he should be bred along blood lines that have proven prepotent and have made good even though used on promiscuously bred sows; a strongly line-bred boar with an ancestry that is unquestioned in the ability to breed on.

Often one may breed an animal that has great individual quality, but without good ancestry, and such an animal should not be used as a sire. A prepotent sire never comes by chance. He must trace to good ancestry to be of much value to the breeding herd. There is no breed of swine without a few outstanding sires that have had great influence on the breed. This great value comes from inherited excellence through generations of good blood, and is the only reliable method of selecting the desirable sires in any breed.

In making a selection of a sire for a pure-bred herd, look first to individuality, then to the breeding back through several generations; see that his ancestors are right and what they have done for the breed. If you find all this to be of a high order and the boar suits you, is a high-class individual, showing true characteristics of his breed, rugged, full of vigor, masculine in appearance, and with all the size possible, not sacrificing quality; conformation as near the standard of excellence of his breed as possible, buy him.

Among the few great sires that have stamped themselves on the offspring of any breed, one can find their characteristics cropping out even to many generations, and if you will go into almost any prominent herd of the different breeds you will at once notice a few outstanding pigs that show in many ways unusual excellence, and if you take the trouble to look up their breeding you will invariably find that they were either sired by some great sire or by a son or a grandson of his, or from a sow by some great outstanding sire; plainly showing the ability of such a sire to reproduce the excellent qualities so much in demand.

On a recent visit to our farm by an expert in pedigrees, it was found after we had selected some fifteen head of pigs, as being the tops of the litters, that every one of them traced to sires of great ancestry.

Once in checking up our card system we found a certain sow had produced a litter of only six pigs; two boars and four sows. The choicest boar was given to the party who had offered us an excellent sow if we would breed her to a certain boar and select him the best boar pig; we were to have the sow and balance of the

litter for the service of the boar. The litter above was the result. We sold the four sows to prominent breeders for \$1,250. All of the sows proved great producers. One had a litter of seven pigs, one of which was used at the head of the herd for years. Three of this litter were made barrows for show at the International Exposition, where one of them was the Grand Champion over all breeds and the others were winners in class. All this goes to prove the value of a great sire, which in this case gave a good record and brought us a great sow for the herd, and \$1,250, for the service of the boar.

There are many such instances on record, which emphasize the value of the right kind of a pedigree as well as "some hog"—which is certainly very necessary. It is also of great importance that the same critical judgment be used in the selection of the brood sows on which the herd is founded that the future may be an assured success.

Every breeder should be constantly on the lookout for a sire which he has reason to believe would help to improve his herd. It is not likely that any man is so well fixed in regard to sires that he need not think of better ones. Wise breeders are always open-eyed and open-minded in reference to new sires for their herds. They keep posted as to the performances of both boars and sows representing popular blood lines. Moreover, they correspond with or visit many of the less prominent breeders for the purpose of finding out how things are going. Such men make most of the so-called "lucky strikes." When they have the evidence that given blood lines are producing extraordinarily good things they are enterprising enough to secure boars or sows representing those blood lines. Sometimes they have to pay long prices; just as often they secure bargains.

A breeder who would steadily advance must pay studious attention to the operations of his fellow-breeders, and thus keep that breadth of mind which is essential to genuine progress. He must war against narrowness, and be big enough to see real merit wherever it exists.

A Sire's Influence.—In speaking of the influence of the sire Prof. C. S. Plumb of the Ohio State University says:

"There is a great deal to learn regarding the reproduction of characteristics among animals. However, one thing is pretty well established, and that is, that what we know as well-bred animals transmit their qualities with more certainty than do those of inferior breeding. It is unfortunate that the results of the most successful experience in breeding are not studied more carefully and made greater use of by the rank and file of breeders. The average man, a breeder so-called, is not in fact a student of breeding at all. Far too many men are interested in simply getting their females in pig, without regard to the fitness of the sire. That methodless way has actually been the undoing of many an American herd. This illustration has been made use of by one author. Let two men start to breeding at the same time. One selects a sire with great care and mates him to a lot of females with the view

of remedying their defects in the offspring and of systematically producing a type. The other buys a sire with no special plan in mind. He merely wishes a male and has no ideals to work toward. What is the result? After a term of years one man has a herd that approaches uniformity and that gives results in a measure approaching his ideals. The other has bred a nondescript herd and produced nothing of serious value. The stock produced by one is in constant demand. The other wonders why he cannot find buyers.

"We have some breeders in America of a constructive sort, men who have done much for the breed. These men have had ideals and have sought to mate with the view of making something better than they found. The number of men who desire to purchase \$12.00 to \$15.00 boars is far in excess of what some might think. They want something pretty good at that. What they really need is a scorching education, by which they are made to comprehend the meaning of the breeding business and what it leads to. It is most unfortunate that so many men measure their needs by a definite price rather than a specific sort of animal.

"Here is a man who has a lot of sows that are inferior in ham development. They may be very good otherwise. With him it should not be cost as a first consideration. Rather it should be the securing of a sire to improve their weakness. No man today holds the trade of the particular buyer who does not recognize this fact and governs himself accordingly. Thus it becomes apparent, and successful breeders readily agree to it, that the man who expects to succeed must mate his hogs to secure the most desirable form through the use of the right sort of sires.

"In my conversation with the best breeders of my acquaintance they have very generally agreed that the most profitable animals they have owned were the highest priced ones. Remember, I have specified *best breeders*, not promoters and speculators. A good many men have paid very high prices and, as we say, "been stung," but this has no application in this discussion. In the purchase of breeding stock, and especially the herd headers, it is a big mistake for one to buy animals without previous inspection. If one will sit down and figure out how far-reaching the influence of a boar may be felt in the generations, he may conclude that it will pay to look into the subject pretty carefully before buying. Think what Longfellow meant in the Gentry herd! In more recent years what a wonderful benefit has come to the breed through the use of Masterpiece, one of the real high-priced boars, in the herd of both Lovejoy and Corsa. Longfellow and Masterpiece are names to conjure with today, and they were the products of men who measured the real value of both pedigree and individual merit.

"The young man starting out in the development of a herd will do well to secure high-class animals, bred well. Better try one good female, a real topper, of both individual merit and with a popular pedigree, than half a dozen common ones. She will pay much the best in the end. That fact has been demonstrated time and again. And the cheap sire is to be avoided. Young men should be ambitious and get sires that bid fair promise to reproduce offspring of the sort in demand. If one aspires to sell breeding stock, a cheap pedigree will be the heaviest handicap imaginable. The average man inquires about pedigree, and if he knows what it stands for he will not want the animal represented by a poor pedigree, excepting at little above pork price. The intelligent, discriminating buyer will not want the stock, however, at any price. If one is not seeking the trade of the select sort, then he might as well step down and out as a producer of pure-bred stock. One should pattern after the successes, not the failures. If one breeder is to have inspiration, it must come to him through a knowledge of the results secured by the men who know how and who have succeeded."

CHAPTER VI

THE HERD BOAR

It is necessary that the herd boar should be a good one, for the reason that during his life he may be the sire of hundreds of pigs, whereas a sow will only produce a limited number during her life time, and if the boar is good enough to improve the standard of the herd, his value as a breeder will be great beyond compare. It is such sires that have made the breeds what they are, and it is such sires that command almost unlimited prices.

Generally speaking, the sire should be a little more on the compact order than the sow. By this I do not mean a chunky, short, thick boar, but one showing full development at every point, and of a strictly masculine type. There is nothing so unsatisfactory as to have the head of a herd show a feminine appearance. The boar particularly should be of the proper type of the breed he represents.

He should be large, without sacrificing quality; smooth and even in every part; a typical masculine head; eyes and ears wide apart; the crest short, full, smooth and free from any creases; the jowl reasonably full and well laid on to the shoulders, which should be smooth and free from creases; a full heart girth extending well down; and the bottom lines nearly or quite on a level, with as deep a flank as possible; rather short or medium length legs with bone of good size and quality; pasterns short and straight, and the hoofs well set; legs standing square and well under him and straight, like those of a Shorthorn, with long, deep ham, tail set well up and of good size.

This type and description would fit any of the lard breeds excepting that the head and ear should be characteristic of the breed he represents. In Poland-Chinas a medium sized ear with the proper setting and roll is desired; in the Duroc-Jersey practically the same type of head and ear, only a little more length of snout allowable, but shorter preferred. These descriptions should be insisted on in making selection, in order that the offspring may show an improvement each year. Careful attention should be given to the blood lines of the sire. He should be what is known as an intensive breeder—one able to reproduce himself and improve the get.

Such a sire is more often than otherwise found in a strongly "line-bred" boar, carrying the blood of closely related ancestors. If of proper conformation he can be relied upon to prove a good sire.

Personally, I would never think of introducing a herd boar into my herd of brood sows that did not carry much of the blood represented by the sows, and yet it is not uncommon for

a breeder to receive letters from prospective buyers insisting that a boar be sent that is in no way related on either side to the sows to which he is to be bred.

Handling the Herd Boar.—The disposition and good behavior of the herd boar depends much on how he is handled from pig-hood to maturity.

Docility is a great thing in a herd boar and he should be so handled that he will never cause any trouble in being driven from place to place. Kindness has much to do with this. The herdsman or owner should never under any consideration misuse the boar, but handle him with a light buggy whip and have him so trained that he can be driven as easily as a horse can be led. This training should commence when the pig is young, and by rubbing him a little at feeding time, he will become extremely gentle and look for these attentions, and as he grows up under this kind of treatment, will become a good natured, quiet, easily handled boar, and it will not require two or three men with a hurdle to bring him out of his yard to be used.

He should always be kept in a substantially fenced yard, with grass to graze on at will, a dry place to sleep in that is warm enough for comfort in winter months, and nice shade to lie under during the hot weather.

Where one has a large herd and keeps several matured herd boars, they can be so handled that they will run together like a bunch of barrows. This can be done by cutting off the tusks very closely, then on a cool day, turn them all together after thoroughly spraying them with good coal tar disinfectant, and stay with them until they have had their fight out at least once or twice, and the boss has been recognized, after which they will let each other alone. We did this recently with five aged herd boars, and by having their tusks closely cut and smooth, they could not make any scratches or cuts in their fight and after several good tussles they gave it up and afterwards fed together along the trough in perfect harmony.

During the breeding season the herd boar should be well fed and receive plenty of exercise. If the lot where the boar or boars are kept, is where they can see the sows, even though at some little distance, it will, generally speaking, cause them to take plenty of exercise walking up and down the lot along the fence, especially during the breeding season.

If they do not take this exercise it will be necessary to exercise them by driving, for they must be kept in prime vigor and perfect condition. It is never wise to use a boar just after being fed; better use him early in the morning before being fed, and after a short walk, so as to allow him an opportunity to empty out both bowel and bladder. During the heavy breeding season he can again be used toward evening after a little exercise and before feeding for the night.

Boar Apart from Sows.—Where one has only a few sows I believe it best to keep the boar in a separate lot from the sows and use as just noted. However, on some farms where a large number of sows are to be bred, a matured boar can be turned in the same lot with ten to fifteen sows and the feeder should carefully note sows in season and mark down the date the same as he would if the sow was taken to the boar. In this way it is possible to keep a close record of breeding dates and every sow will doubtless be gotten safely with pig without injuring the boar. Care must be taken not to turn a young boar in with a large bunch of old sows, and if your boar frets under this treatment and is getting out of condition it would be wise to put him by himself, feed him well and take the sows to him. Judgment must be used in matters of this kind, as it is the little things that are often most important and have much to do with the success or failure of swine breeding.

While the herd boar should not be overloaded with fat, he should be in a reasonably strong fleshy condition, the result of proper feeding along lines that will not produce too much fat or white meat. A muscle-producing-feed should be used, such as middling, oats, peas, barley, a little corn and tankage, etc. Use a variety of feeds, with of course what grass he will eat, or other succulent feed such as should be found on every farm.



CHAPTER VII

SELECTING BROOD SOWS

When the breeder or farmer lays the foundation of a herd of brood sows it is necessary that he first make up his mind what breed of swine he wishes to commence with. I am not recommending any particular breed. There are a number of standard breeds and they are all good, especially five or six of them. Looking over those known as the lard breeds, one cannot go wrong by selecting any of the following, named in alphabetical order: Berkshires, Chester Whites, Duroc-Jerseys, Hampshires and Poland-Chinas. There are also a number of Cheshires and Victorias used in the far eastern states, probably more of them in New York than any other state, and they are a very satisfactory breed.

Among the breeds known as bacon breeds, are the Large Yorkshires and Tamworth. Further than these there are several small breeds, used locally, such as Essex, Small Yorkshires and Suffolks; the latter three breeds are used little in the western states.

Get Posted.—After deciding on one of these breeds for a foundation herd, it will be best for one entering the business to post himself as well as possible regarding the characteristics of that particular breed, and it is my opinion that other things being equal, it is better for a man to produce only one bred and that should be the one he thinks he would like best. He should never attempt to raise a breed of hogs he does not like, either purebreds or for pork.

If he is going to raise hogs to sell on the market or to follow cattle, he need not be as particular about bloodlines, but should be just as particular regarding individual type and characteristics. Let him make a careful study of type, size and general conformation, and always remember the desirability of getting as much size as possible without sacrificing quality.

First let him see a number of the breed he wishes to purchase, that he may have no reason afterwards to regret his selection. This rule will be necessary no matter what breed he selects. No better place can be found to study breed characteristics than at county and state fairs, at the International, and at public sales of pure-bred swine.

Type of Sow to Select.—It is well in making the selection of a foundation herd of brood sows to secure only those that show good length of body, well-sprung ribs, with deep sides; a full loin; long deep hams, with as straight legs as possible; not too high above ground when in ordinary condition, and with a full heart girth giving plenty of room for the vital organs such as heart, lungs, etc. The head should be characteristic of the breed. The neck short with

a reasonably full jowl but not heavy and hanging—especially not flabby. This should connect with the shoulders smoothly; the crest should be reasonably short without crease or deep wrinkle laying both on top and sides smoothly to the shoulders. Shoulders should be well filled but not too broad on top to give flat appearance, but should be round and smooth without crease back of them at the heart girth. It is better always to select a sow that is strong in the back, somewhat arched, so that even when carrying a heavy litter her back would show no sign of sagging. From the loin coupling, to what is known as the tail head, or where the tail sets, should not be too steep or drooping, giving the top line a bad appearance, but should on the other hand, be well up or nearly on a line with the loin—at least but slightly drooping.

It is common with some farmers and even with breeders who have had years of experience, to select a brood sow that is too short and thick throughout; such an animal is not apt to be as good a producer as one with more length, more depth and mellowness in her general make-up. One should look well to the bone, pasterns and feet. It is not necessary that the bone should be extremely large in diameter, like that of a Clydesdale or Shire horse, for often an extremely large bone in a hog does not have as much firmness and strength as a bone that is not so large. The pasterns should be as short and upright as possible. This is surely one of the important things that we should look after in all of our present-day breeds. If the pastern is short and the bone of good quality there will never be any trouble with broken-down feet.

When it comes to the foot proper, the toes should be short and not too sprawling, or in other words they should set rather close together. The legs should be straight from a side view of the animal, as well as from an end or front view. Often one finds a hog with a front leg as crooked as a "fist" dog, with the knees close together and feet wide apart, giving a very bad appearance to the animal. Regarding the hind legs, they should be as straight and upright as those of the Shorthorn, rather than being what is known as "sickle hocked" and should stand square under the body.

The Coat of Hair.—The coat of hair should be ample, yet not curly or coarse, and the smoother it lays on the body the better; all appearance of what is known as "swirls" should be avoided, especially if the animals are intended for breeding purposes, and the boar should not be considered if he has a "swirl." For the benefit of the beginner, I will explain that a "swirl" is what would be called in the human race, a cowlick. In some hogs these are quite small and hardly noticeable, while in others they appear as large as a saucer and are generally located near the loin and some times near the tail head.

A Crank on Markings.—In selecting brood sows of any breed, it is not so much how they are marked as it is whether or not they are good sows of the right type, quality and conformation. Of

course this trouble will not come up about those whose color is solid, such as the Chester Whites, etc., but in the Berkshires, Poland-Chinas and Hampshires, one often meets a man, who is more particular about fancy markings than he need be. I do not believe that a perfectly marked Berkshire sow, bred to a perfectly marked Berkshire boar, would ever produce a litter that was perfectly marked, nor do I believe that a sow or boar with one black foot, black switch, or a white splash on the jowl or arm would ever produce a litter that was all marked like the sire or dam. Of course the nearer the litters come to being perfectly marked the more we are pleased, but we should look more to conformation, size and quality, than to the markings.

We once paid \$225 for a son of old Longfellow that had a splash that nearly covered his entire left jowl and face and I cannot recall that he ever sired a pig with the same marking. This rule will apply to the Poland-China breed, and to the Hampshire when the white belt varies in width and shape as well as some of the feet having white part way up the leg. First look for quality and size, then let the markings be a secondary consideration.

See also, in selecting your brood sows, that there is a mellowness to the touch, which shows feeding quality. Avoid one that is hard and coarse to the touch.

In selecting a herd of brood sows, it is my judgment that the more uniform in type, size and conformation the sows are, the better, and I would even go so far, if I were selecting but a few, to have them all from one or two litters if possible, rather than take the risk of getting such a great variety of types by the selection of individuals from different families, and I would have them from reasonably large litters.

While we all like good-sized litters, I am not a crank on this subject. I prefer litters running from seven to nine rather than from ten to twelve pigs each, and believe I could make more pounds of meat and obtain better growth for breeding purposes, than I could from extremely large litters. Of course we occasionally find a good sow that can grow a litter of twelve or more, but the pigs are not apt to be as thrifty and as growthly as those of a litter of eight or nine. It is better to have pigs of a litter of medium size that are very thrifty, than those from a larger litter that cannot get enough nourishment to develop as they should.

CHAPTER VIII

AGE, TIME AND SEASON FOR BREEDING

I am a firm believer that for best results animals should not be bred too young. Many breeders and farmers make a great mistake in selecting the sows they wish to breed from the spring gilts each year, also selecting from his own herd, or some other, a young boar from a spring farrow, rather than carry over his older sows and keeping a mature boar. I am positive that it is much better to use only mature animals for breeding or those as nearly matured as possible. We all know that a sow from two to five years old bred to a boar of about the same age will produce stronger pigs with considerably more size and weight at birth, than will a young gilt, and yet many men each year purchase young bred gilts.

I think the average litter also is larger in number from mature animals. Furthermore, it has been my observation that the farmer who each year selects young gilts and breeds to a young boar and follows it up for a number of years, gradually reduces by this process the stamina and vitality of his herd, causing them to be in a condition to contract disease much easier than would older animals. For this reason I would advise that, for best results, nothing be bred under one year old, which would bring the litter at about sixteen months of age, at which time the animals are well along toward maturity. After having started a sow to breeding and it is found that she is a good producer, a good mother, careful of her litter and a good suckler, by all means keep that sow as long as she produces satisfactorily, and when you strike the best mating, or one that proves highly satisfactory, continue to breed her to the same boar, rather than take chances by changing.

It is not necessary to do as we have done once or twice, to keep a sow almost up to the limit of the average usefulness of production, or you might get caught as we did, by having quite a number of sows, that had been valuable breeders, but by holding too many years, all quit breeding at once. It is very hard when one has a sow that produces very high-class animals to quit using her until he is obliged to.

We bred a sow once in her 13th year and she produced one pig; of course she had been a valuable sow or we would not have retained her in the herd until that age. When she farrowed her litter of only one pig we concluded it was time to stop, so we fattened her and sold her to the local butcher. He remarked as he looked her over that she was no spring chicken, and some weeks after when I asked him how the old sow turned out, he said all right in every way.

Breeding Season.—The season in which it is best for sows to be bred depends entirely upon the part of the country in which

you are located. Breeders and farmers residing in the southern states where cold weather is not a factor, may breed at any time of the year, and this is a great advantage over those of us who live in the northern or eastern states. In the cold weather states, it is best not to have pigs farrowed later in the fall than September, and by no means later than the latter part of October, for the reason that these pigs will be farrowed too late to get sufficient growth to be weaned and fed by themselves before the weather becomes too cold for best results in development, unless one is especially fitted with conveniences, such as warm sleeping houses, etc., with plenty of warm feed to continue their development without check.

Nothing looks so bad as a little pig in the winter time doubled up with cold and its hair pointing to its ears, but where the pigs can be properly taken care of and continue to grow and look smooth and thrifty, then it is a different matter and they are fully as valuable as the pigs farrowed in the spring, because they come to the proper breeding age the fall following their birth, and there is nothing more desirable or that sells better than fall litters that can be bred a year from birth.

With the spring litters the northern and eastern breeder must also be a little careful. It is all right in this section to have a few pigs farrowed in February, but that is not generally best. There are men who probably would like to buy February pigs, as they have a little more size when the fall breeding season commences, than those farrowed later, but they require much more attention to bring them to weaning time than would the litters farrowed in March and April; besides none of the February pigs could be shown the following fall in the under six months class. This in a measure militates against their being sold to breeders, but would be all right where sold to farmers for breeding purposes without considering the matter of showing. However, this is a matter that is up to each farmer or breeder, as he sees it from his own viewpoint.

Use of Breeding Crates.—There is considerable difference of opinion regarding the use of breeding crates, but I have long considered them a necessity, although we do not use them in every instance. Where there is much difference in size of the animals the crate should be used; on the other hand where the size is nearly equal, perhaps just as good or better results can be had without the use of the crate, yet every well regulated establishment should have one or more reliable breeding crates. Some claim that using a crate is against nature, which may be true. I believe, however, when the crate is to be used, the animals to be bred should be turned together for a short time for the purpose of getting acquainted, and the teasing is no doubt a great benefit, but the practice of forcing a sow into a breeding crate, then bringing the boar to her, without any teasing, does not always work out as expected and sometimes creates much trouble. When everything is all right, a crate is quite satisfactory. Any crate used for this purpose should be adjustable both in length and width. If sows can be bred without a crate, it is better, as a general thing.

CHAPTER IX

FARROWING TIME

It is presumed that all breeders of pure-bred stock keep a record of the date sows are due to farrow. If this is not the case trouble is sometimes the result. As farrowing time approaches no unusually special care need be given to the brood sow if she has been fed along lines laid down in this book, and if she has had sufficient exercise during the gestation period. It is only necessary that she be placed in a quiet, warm, dry place in winter and cool in summer, a week or two previous to the date of farrow. This should be done so that she may become accustomed to the new surroundings.

As the time approaches for the coming of the litter, see that the sow gets out of her sleeping place daily and takes plenty of exercise, otherwise she will become more or less constipated. If such is the case, two ounces of Epsom Salts should be given her in the slop daily until her bowels are in a laxative condition. See that the place where she is to farrow is provided with a guard rail around at least three sides of the pen, to protect the young litter being overlaid by the sow and crushed.

If everything is going right with the sow at farrowing time, let her alone. If one finds that after several hours of labor, there are no pigs in sight, it is well enough to investigate. Often by oiling the hand and entering a few inches, one will find either the leg of the pig or its head can be reached, when a slight pull results in an immediate delivery.

If the sow is unduly fleshy and seems closely built, it is a very good plan, when she is ready to farrow, to inject a little oil—either sweet oil, cotton seed oil, or any that is clean and pure—that the passage may be made easy.

During nearly forty years of breeding, we have only had to resort to pig forceps once or twice, and then generally without good results.

Cold Weather Precautions.—If the weather is cold when the young pigs are just farrowed, we have made it a practice to have close at hand a barrel or box with either a hot brick or two or a stone heated and laid in the box and covered thickly and deeply with chaff or cut straw, and as fast as the youngsters appear we wipe them off with a cloth and place them in this box, where it is warm, covering the same with a blanket, and wait for the next one's appearance, keeping this up until the entire litter is farrowed, if not continuing over too long a period. If several hours' time is occupied in farrowing the litter, we let those that have appeared nurse once or twice during the time, placing them back in the box

as soon as they have nursed sufficiently, and when the whole litter is farrowed, we place them all with the mother, and if everything goes right and the mother is quiet, leave them there. If, however, she is ugly and inclined to get up and turn around and act badly, we place the pigs back in the box to keep them warm, and wait a short time until she is again settled. But generally, after the sow permits the litter to nurse once without undue restlessness, she will be quiet with them.

We have used a farrowing box for many years, and consider it one of the best appliances in the equipment of a farrowing house, for while the sow can easily lie down on either her right or left side, she cannot turn around or lie down on the pigs, as they are protected by the sides of the farrowing box which do not extend clear to the floor, but have a space of some nine inches in which the youngsters can run out into the outer part of the box at either side or end. We found in the last Spring farrowing of over two hundred pigs, that only three were injured in the farrowing box. In a large herd three or four of these boxes would be one of the best investments that could be made.

After the pigs are two or three days old, they, with the sow, can be removed to an individual house or pen, without much danger of their being overlaid by the sow, unless she is deaf, which is sometimes the case, but such a sow should be sold for pork and not kept in the breeding herd.

Occasionally one finds a sow that is very nervous after farrowing. She will get up and lie down again frequently, and may crush one or more of the newly farrowed pigs. It is well to give such a sow a small feed, mostly of bran with a little middlings or cornmeal, as this will often quiet her. If she is extremely nervous and insists on getting up and down, pour one teaspoonful of laudanum into her ear.

Keep Breeding Dates.—Every breeder and even every farmer and grower of hogs for market should keep correct dates when his sows were bred and should put down the date to retry them, making it from twenty to twenty-two or twenty-three days from the date bred, and should not neglect when this time comes, to try them again and see if they are settled or if they will have to be rebred. This should be carried on at least to the third period after first breeding, so that he would absolutely know that his sows are safe in pig, and if they are to be used to fill orders for bred sows, he should still keep tab on them and not ship them out until they show their own guarantee that they are safe in pig. It is a very distressing thing, both for the purchaser and seller, to find after shipment, that the sow shipped had failed to prove in pig. Better wait a little longer before shipping and know that the animal is absolutely safe in pig.

CHAPTER X

CARE OF THE BROOD SOW

To have brood sows in prime condition at the beginning of the breeding season, in the Fall, it is well to have them come off from good fresh grass or pasture of some kind, having for a short time been fed grain and being in a slightly gaining condition. This usually brings them in season very shortly, and generally where there are many, all will come in season about the same time. This is well, as it enables a large number to be bred as near the same time as possible, and the litters to arrive about the same time in the Spring, thereby giving one a large number of youngsters of practically the same age.

During the time these sows are being bred and carrying their litters they should be fed absolutely right for best results. First and all the time they should have plenty of exercise—the more the better. If they could run about the pastures and fields during the daytime, between the feeding periods, it would be well, and they should sleep some distance from where they are fed.

Her Feed.—The feed should be composed of a variety and should be as nearly a balanced ration as possible, containing the proper amounts of both fat and bone-making material, and never solely an all-corn ration. Of course corn is the cheapest feed one can use in the cornbelt, especially if he grows it on his own farm, and if this must be used for the sake of economy, it can be to the amount of about three-fourths of the ration, with the other fourth composed of feeds containing a high percentage of protein. Tankage fed in the proportion of one-tenth to nine-tenths corn, makes practically a balanced ration. Hogs on alfalfa or green feed, need less tankage. For convenience it would be better to grind the corn and mix the tankage with the meal, which can be fed dry or soaked and fed as a slop.

With this ration a feed of the third cutting of alfalfa hay, which is always bright and green, would be an excellent addition, giving both bulk and green feed for the sows.

A mixture of one part shelled corn, one part oats, and two parts finely cut alfalfa hay put through a cutting box, makes a nicely balanced ration, with the addition of five per cent. tankage, or where skim milk is plentiful, use it instead of tankage, in the proportion of three pounds of skim milk to one of grain.

Another good ration is equal parts of rye and barley ground fine and mixed with twenty-five per cent white middlings or shorts—on account of price of middlings, although middlings are very good—adding about five per cent. oil meal or tankage. This makes almost an ideal ration.

A small per cent. in weight of a good quality bran added to any of the above makes a valuable addition.

Plenty of Water.—One thing must not be overlooked, and that is plenty of clean fresh water. If it can be had at will, so much the better; if it cannot, it should at least be given once or twice daily, for the hog needs a drink of water as much as any other animal or human being. I have known pigs to walk directly from a wet feed of nice rich slop to a drinking fountain and take a good drink of water, as though they had been fed on dry feed. I really think that the majority of breeders and farmers overlook this matter of letting the hogs have plenty of water to drink.

Further, the brood sows during the season should, if possible, have some kind of green feed or pasture. Of course in parts of the country where there is heavy snow, something must be fed to take the place of pasture. There is nothing equal to the third or fourth cutting of alfalfa for this purpose. This, if cured without being damaged by rains, is practically as green as it would be in June, and is greatly relished. It can be fed in racks, properly made, and mentioned elsewhere in this book, or it may be run through a power cutter and chaffed and fed with a portion of the grain ration, as above recommended. A mixture of salt, charcoal, wood ashes and ground limestone or slacked lime is absolutely necessary, and if convenient add also a portion of ground phosphate rock. This mixture adds much in the way of mineral matter that is so necessary in building up the bone and frame of the unborn litter.

Brood sows should have a dry warm place to sleep, and but few in number—not over ten or twelve—should run together or sleep in one compartment. This is to avoid their crowding or piling up too closely.

The future of the pig depends much, in fact more than is usually realized, on what the dam receives in feed and care before the birth of the litter. "A litter well born is half raised," and there should be no immediate change in the feeding formula for the sow having just farrowed a litter of pigs from what she has been having during the period of gestation, only after farrowing the sow should go at least twenty-four hours without feed, with what water she will drink, which in cold weather should be given her with the chill taken off; then, a very light portion of the same feed she has been having. If she has been fed a dry feed, it would be well to use the same proportion in the mixture, only feed it as a slop, with warm water during the winter in a cold climate, and cold water if in the southern states.

This feed should be gradually increased as the litter is able to take all the milk furnished by the mother. Usually at the end of one week, if the litter is an average sized one, the sow can be fed all she will eat up clean.

By the time the pigs are three weeks old they will eat a little on the side from the trough with their mother, and if it is desired to push them to the limit in growth, a small feeding space can be

arranged so they may feed from a very low, shallow trough by themselves, unmolested by the mother, giving them the same feed given the mother.

During this period of the early life of the litter the sow and litter should take plenty of exercise for the necessary good of the pigs, for they must exercise considerably during each day, or they will become fat around the heart and die with what is known as "Thumps," which is nothing more or less than fatty degeneration of the heart, which they will certainly have unless they are exercised daily in some way.

Weaning Pigs.—As weaning time approaches, which should not be earlier than ten to twelve weeks, in my opinion, the feed may be lessened for the sow and more given the litter, so that the sow would gradually give less milk and have no trouble when the pigs are taken entirely away. Some breeders have made it a practice to gradually wean the litter by taking them away for a few hours and then returning them to the mother and following this up for a few days until they are taken away entirely. Others have practiced taking one or more of the most thrifty pigs in the litter away from the mother first, then after a few days a few others, and finally taking those remaining, believing that pigs so weaned would leave the sow in better condition and less danger of swelling and soreness of the udder. We never have practiced this, however, during our forty years of breeding. By letting the litter suckle until it is ten to twelve weeks old or a little over, the sow naturally is inclined to wean them herself and if she has been properly fed the last part of this period she will practically give no milk at the end of three months or thereabouts.

When the litter is finally weaned the sow should be given a good fresh pasture of some kind with a little grain and she will need very little else during the next month or two or until time to begin to bring her in condition for another season's breeding.

We pastured 40 brood sows that had weaned their pigs in May, by turning them directly into a fresh white clover and blue grass pasture where there was plenty of shade. They had no grain or slop for four months, but were given daily from a water fountain all the fresh clean water they could drink. They did well on this grass and water diet, but hereafter we will feed two or three ears of corn daily to each sow, besides the grass and water, as I believe for best results they should have a little grain. The sows that were bred for fall litters ran in the pasture with the others and were removed into individual lots about a month before farrowing where they were given a little corn and some slop with plenty of grass.

To have two litters a year sows must wean their spring litters by May 1, so as to be bred for early fall farrow, and the fall litters must be weaned in November or early December so as to be bred for March and April farrow. In the north it is not always practical to have two litters a year and we find it often advisable to breed the sows so that they will farrow one litter the first year and two litters the next year, or in other words, three litters in two years.

CHAPTER XI

MARKING

The matter of having each litter marked so that pigs may be identified at any time, is one that every breeder of pure-breds at least should follow without fail. There is nothing that would be more embarrassing than to have a prospective buyer, when looking over the pigs ask how we identify them and be unable to answer satisfactorily. After trying all kinds and varieties of ear labels we settled many years ago on the only system that we have found entirely reliable, and one that never fails to remain where it is put. This system is a series of small punch marks in the outer and inner rims of the two ears, and is fully illustrated herein.

One thing is quite important, namely, that a small punch be used, one not larger than the largest size in a revolving harness punch. The punch should be set on the rim of the ear, only cutting out a half circle. If too large a punch is used the marks become too prominent as the pig grows to maturity.

A small vest pocket memorandum book should always be carried, using one leaf for each sow and her litter, with the stamp, as shown in the illustrated system of marking, showing the same ear marks as are given to the pig. In this way as one goes through the herd and asks for the breeding of different pigs, it can very readily be given, by referring to the small memorandum book. To illustrate: Suppose a prospective buyer selected a pig and said to me, "this pig has two marks in the right ear outer rim and one in the left outer rim. What are his sire and dam and date of farrow." By referring to the book showing this mark I will find it is the fifth litter farrowed during the year and shows that the sire was Rival's Majesty 150500 and the dam Locksley's Artful Belle 178745, and that it was farrowed March 13, 1918. This is all in a nut shell and very satisfactory to the one asking for the information.

In this system we use the same mark for each pig in the litter, as the pig is not named or registered until sold, then a name is given and a registry number which is entered on the card record of that particular litter. If a sow in this litter or a boar is retained in the herd the card record should show it and ear mark as well. This system is started anew the 1st of January each year, as the previous year's litters are supposed to be sold, but for the few that are not, or are intended to be retained in the herd, a memorandum is made.

Record of Litters.—We have found the following card system for keeping a record of the litters, as well as disposition of each, to be the most convenient of anything we have ever tried. The cards should be 5x8 in. as illustrated. On one side should be written the pedigree of the dam, her description, showing the ear marks she

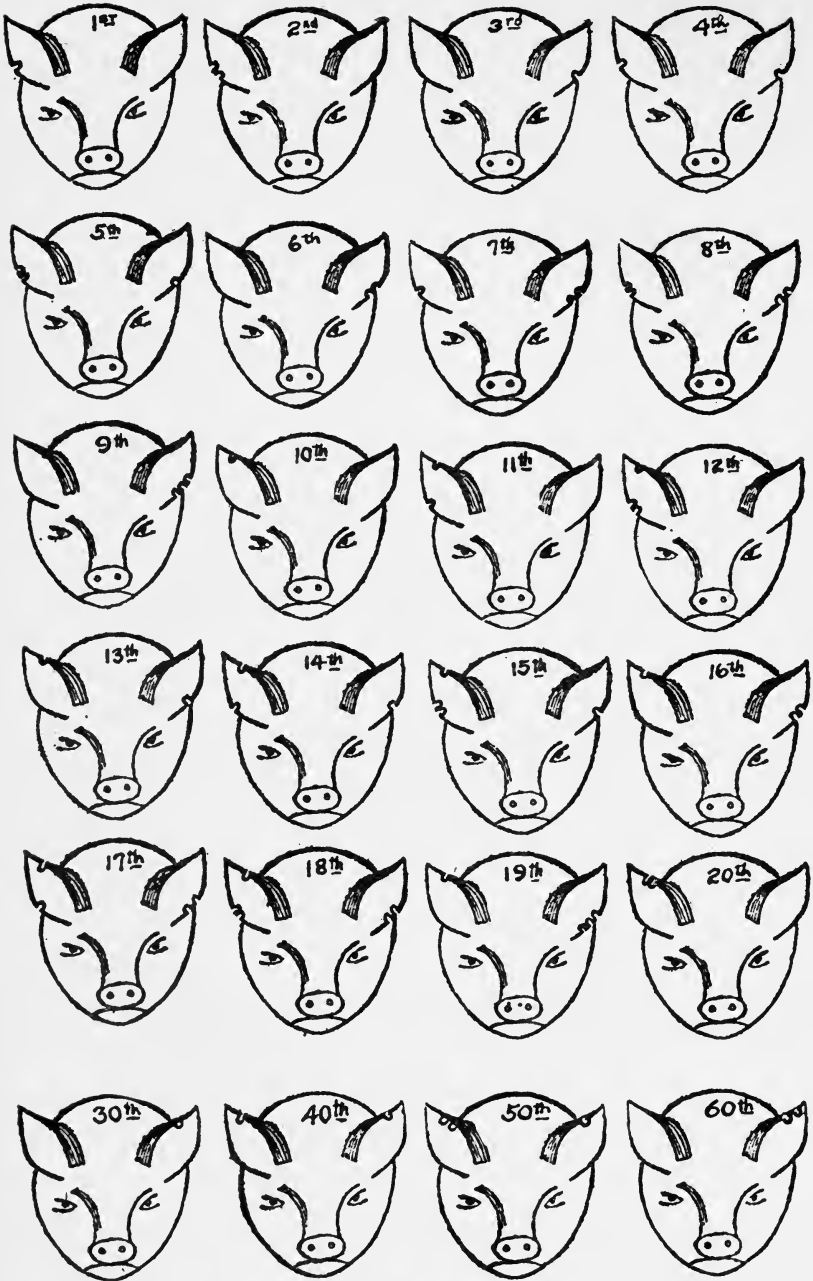


PLATE VIII. Ear Marking Chart

carries, and the date she was farrowed. The opposite side, as illustrated should show the sire and dam of the litter giving their herd book numbers, and cut of the pigs head should show how the litter was marked. You will note that this side of the card is ruled for the purpose of entering on same the disposition of the pigs of the litter; the pigs that were sold as breeders as well as those for pork should all be entered on this side, showing to whom sold and price; and where a portion of the litter was sold for pork, or butchered for family use, they should also be entered. Those sold for breeders should have their name and herd book numbers in proper column as shown. We give one of these cards to the litter of each sow. If she has two litters in one calendar year she has two cards to show what her litters were in number and what disposition was made of them. It would surprise many persons to see the footings of the sales from a registered sow seven or eight years of age, that has been a good producer once or twice each year. These cards should be kept in a small cabinet drawer and each one numbered with the number given to the sow, so that all cards for that sow may be of the same number and in the same pocket. It takes but a moment's time where this system is followed to open the drawer of the cabinet, take all the cards belonging to a certain sow and add up what her produce has brought you. I had occasion a short time since to look over the cards of an old sow who was beginning to get along in years, and added up what we had received for her direct produce since she was old enough to breed, and found we had sold from this individual sow over \$3,500.00 worth of pigs, and none of them at an extravagant price. It is much more convenient than having to use a herd record, as the cards are all in one bunch and quickly viewed. We have had many letters in the last few years asking us to send a blank card showing this system, and all inquirers, so far as I have heard, have put the system in practice and are well satisfied with it. A breeder cannot be too careful in keeping absolutely correct records of dates of farrows and of pigs sold.

DESCRIPTION

A large typey sow, nicely marked



FARROWED March 20th, 1906.

Matchless Perfection 2d 100008	{	Masterpiece 77000	{	Black Robinhood 66086	Imperial Duke 43929
				Black Girl 40th 33681	
	{	Lady W 89229	{	Duchess 221st 56527	Lord Premier 50001
					Duchess 192d 50028
	{		{	Royal Premier 67382	Lord Premier 50001
					Stumpy lady 17th 58030
	{		{	Lady Majestic 22d 88129	Rockland Gentry 51027
					Rockland's Majestic 4th 53698

PLATE IX. Farrowing Record Card, Showing Pedigree of Dam

INDEX No. (20)

A. J. LOVEJOY & SON.

BOARS (4) SOWS (5)

FARROWED March 2nd, 1907.

SIRE of litter. Majestic Baron		DAM of litter Matchless Perfection 2d	
SEX	NAME	NUMBER	SOLD TO
B	Matchless Baron	100928	John Doe James W Smith, Geo. H. Brown Wm. George
B	Matchless Baron 2d	100929	
B	Matchless Baron 3d	100930	
B	Matchless Baron 4th	100931	
S	Matchless Belle 5th	100932	Warren Bros.,
S	Matchless Belle 6th	100933	
S	Matchless Belle 7th	100934	
S	Matchless Belle 8th	100935	
S	Matchless Belle 9th	100936	Total for litter sold— Kept in herd for our own use.

PRICE

150.00
100.00
75.00
125.00

400.00

850.00

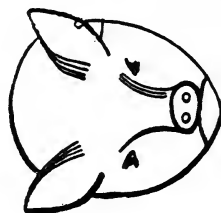


PLATE X. Farrowing Record Card, Showing Record of Litter

CHAPTER XII

CARE OF PIGS

Three Months After Weaning.—Weaning time is a very critical period in the life of the pig. We will suppose that the pig has been fed in addition to what he received from the mother, so that he is well started, and, without changing the rations he has had, he should be fed at least twice daily all that he will eat up clean. It is a bad custom to feed any animal more than it will eat and clean up thoroughly. The pig should have, in addition to what it is fed in concentrated ration, at all times of the year, the run of a good fresh pasture of green feed. The different varieties are treated in another chapter.

Probably the most economical ration for pigs for the first three months after weaning is a mixture of home-grown grains, preferably ground into a fine meal and properly balanced. If one is growing his own grains for hog feed, a good ration is a mixture of corn and oats very finely ground. I do not mean broken up with a cheap steel grinder, but ground into a fine meal, and if it could be sifted, so much the better. Oat husks are not a very desirable adjunct in the mixture, but will not injure the pigs after a few months old, but during the first few weeks of their lives the husks prove more or less irritating in the intestines. This mixture would be improved by an addition of ten per cent. tankage of not less than sixty per cent. protein, unless one has enough skim milk with which to mix the ration into a slop as thick as can be poured. There is nothing better for growing pigs than skim milk properly balanced with three pounds of milk to one pound of ground carbonaceous grain. More than this amount of milk per pound of grain should not be used. Where there is no milk, tankage will practically take its place in balancing the ration.

All the feed should be fed while sweet. When the weather is not too hot it would be better to mix it ten or twelve hours before feeding, or so that it would soak after morning feeding time until the evening feed, and vice versa. If it is desired to feed three times a day, the noon feed could well be made up of shelled corn soaked at least twenty-four hours, or until the kernels become softened. Remember always to use the liquid or water from the soaked corn to help in mixing the slop feed, as there is a large amount of nutriment in water from soaked corn. It has been said that "it is to a pig what beer is to a Dutchman." Some feeders use ear corn for soaking, but I have never liked to feed wet ears of corn, much preferring to shell it and soak as above. Above all, feed only clean corn.

Here let me mention again the matter of clean, fresh water never being neglected.

Sanitary Precautions.—In addition to the feeding and watering, there are other little attentions that must not be overlooked. The pigs should, if possible, have a shallow cement pool that could be used as a wallow, and it should be so made that the water can

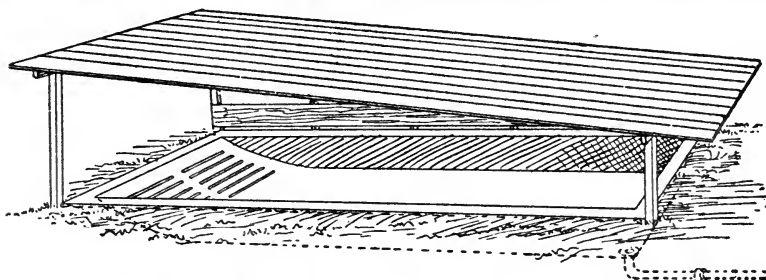


PLATE XI. A Convenient and Sanitary Hog Wallow

be changed every day or two. By having this kind of a wallow, and adding a good disinfectant and a little crude oil poured on the water, the skin of the pigs will be kept in perfect condition, without any danger of skin disease or eruption.

Where one is not prepared to place these clear water pools or wallows, he should have a dipping tank. A dipping tank certainly gets the dip and oil on every part of the body, for the animals have to plunge or slide down the chute into the dipping tank, which thoroughly immerses them.

One great trouble is that the pigs are not run through the dip as often as they should be. Once every week in warm weather is none too often if there are any lice or indications of skin trouble. After they once become entirely free from all such troubles, once every two to four weeks will do.

If, however, there are lice on the pigs, a good quality of crude oil should be added to the dip, and the sleeping quarters carefully looked after. It would be useless to dip a drove of lousy pigs and allow them to return to an infected sleeping place. The sleeping quarters should be thoroughly cleaned out and the ground or floor thoroughly wet with the dip. This would be beneficial in several ways; if the ground was used instead of a floor, it would be dampened by the dip and oil. The oil would certainly be a great help here as well as in the dip, as it would keep down the dust. After the sleeping place has been oiled once or twice, there would be no danger of an accumulation of dust during the season. If the ground is treated in this way, there will be no need of bedding during the summer months, or until the weather becomes cold and bedding is needed for warmth.

We have noticed in caring for pigs, that it is often the case that the feed used lacks in mineral matter, and we have therefore found it a great help to keep a mixture of mineral matter in troughs or boxes where the pigs and hogs can go to it at will, and it is surprising how much will be eaten by them. The mixture we generally use

is composed of ground rock phosphate which we buy for use on our land, and to this we add finely ground limestone; to give it a flavor and a relish, also mix in some salt, and often add to this slacked lime, thoroughly mixed; these ingredients form a very desirable mineral feeding preparation.

In carrying the pigs along from weaning time to maturity, too many should not be allowed to herd together—especially is this true if they are of various sizes and ages. Where they must run together in large numbers and various sizes, there should be a separate feeding place with a graduated creep where small pigs can pass through and eat by themselves, unmolested by the larger ones. There is no surer way of getting a bunch of runts on the farm than by allowing all sizes to eat in the same feeding yard.

A creep of from 12 to 16 feet long can be made between panels of a fence dividing the feed yard where large numbers are fed. These spaces should be made of rollers with a piece of iron in each end standing upright and set into a two by six or other size timber just wide enough apart, so that smaller pigs can pass through without injury.

Pigs carried along in this way and fed and attended to in the above manner should make rapid growth and development, and if desired to be kept for breeders, this same treatment can be carried on during the first year. If it is planned to put them on an early market, and at a weight of from 200 to 250 pounds, the ration can be somewhat changed for the last sixty days by using more corn and a little less of the other kinds of feed.

Probably better weights can be made and much more economically with ninety per cent. corn and ten per cent. tankage. This ration, by actual use, put a car of hogs on the market that topped the market, and showed by records to have been made at a less cost than those that were fed corn alone. It is a well-known fact that the first one hundred pounds of growth of any hog is made at a much less expense than any other subsequent one hundred pounds. So it is economy to feed all the good feed that can be properly digested from birth to maturity.

There are feeders, and always have been, and probably always will be, who pay little attention to their pigs during the growing period of the first six months, believing that if they are turned out into any old pasture and can get water to drink, that they can grow a frame and some size at little or no cost. This may do for the careless farmer, who does not wish to give any time to his crop of pigs, expecting to do it all after they have lived long enough to develop some frame, which is in some way to be covered up and rounded out with an all-corn ration thrown out to them in any kind of a yard, in any season, expecting them to make pork at small expense and little time given to their care. This may be satisfactory to that class of men, but it has always been our plan and belief that the mother's milk fat of the little pig should never be lost, but be increased by liberal and proper rations during its entire life.

After Six Months Until Marketing.—After the pigs have come to about the age of six months, there should not be much change in the feed from what they have had since weaning time; however it is well at this time to increase the corn or the fat producing element in their feed, and reduce somewhat the other elements. Probably at this time there is nothing better than a rape pasture with what corn the pigs would clean up each day, with the addition of about 10% in weight of corn in good meat meal or tankage. This will bring them on to a finish and put two curls in their tails. This for spring pigs in preparation for early marketing in the fall or for shipping out as breeders. The grain ration of course may be varied, using ground corn meal with 10% tankage, or by using ground barley or wheat or rye with corn meal. Any mixture of fattening grains balanced with a little tankage where skim milk cannot be had is all that is necessary with good pasture to make rapid gain.

Weight for Age.—This is a very difficult subject, as there is no iron clad rule for pigs of certain ages. A litter of pigs from a sow that was a poor milker would not grow out at weaning time nearly as heavy as a litter the same age from a sow that was a good milker. Neither would either litter make as many pounds per age in the hands of a poor feeder as in the hands of a good feeder. Much will also depend on the inherited ability from the sire and dam. Even different individuals in the same litter would differ in weight at a certain age if each was fed by the same man on the same ration, so it seems that not much information can be given along this line, except in a general way.

One feeder will take a litter of pigs from a sow, that he is particularly interested in making as large as possible at six months of age, and he can make them weigh as high as 225 pounds each, and possibly even more than this. He may take another litter and fail to make, with the same care and ration, even 180 pounds each at six months of age.

On the other hand the pig that is pushed to weigh every pound possible at six months, will, if he accomplishes the feat of weighing 225 or 250 pounds, as is occasionally the case, be practically ruined for future use in the breeding herd, but of course for the market he could be cashed in quicker than a much lighter weight pig. I think fair weights might be as follows:

3 months of age	60 to 75 pounds
6 months of age	140 to 180 pounds
8 months of age	225 to 250 pounds
1 year	300 to 350 pounds

This will be about right unless the pig has been crowded for show, or for the purpose of seeing how heavy it could be made at a certain age. For breeding purposes pigs that are not developed too fast up to from 6 to 9 months of age, generally develop into larger and better breeding animals than those that are crowded to the limit from birth.

CHAPTER XIII

SYSTEMS OF BREEDING

Inbreeding.—This is one of the surest ways known to establish permanent type in animals, and has been from the time of the early history of improved herds of swine, as well as all other domestic animals. It might be said it is nature's way of reproduction among animals and all living things, except the human family, but it must be carried on with great caution when handled by man. Of course in the matter of wild animals, birds, etc., it is simply a matter of the survival of the fittest, so that weaklings would never probably be reproducers of their kind. For instance, take game birds; there seems to be no degeneration of their species, as there would be in animals of the domestic kind if they were allowed to take nature's course unlimited, but a man of wise judgment can inbreed even to a great degree by being extremely careful in his matings and always seeing that no female with a marked weak point in her make-up is ever mated with a sire with the same weakness. In other words, the mating should be of two animals of similar blood lines, both strong and well developed in their general make-up. In this latter case the produce should be an improvement on either sire or dam, and yet there will occasionally crop out an inferior animal or two in the offspring which should immediately be discarded as a future reproducer of its kind. Herds would be improved to a great degree if this rule was practiced intelligently, but woe be unto the practice of *indiscriminate* inbreeding.

Line-Breeding.—This is somewhat similar to inbreeding, but not carried to as great an extent. It is the mating of animals along similar blood lines on the part of both sire and dam with occasional out-crosses, that is, a cross of different blood lines, *but of the same type*, a little further back in the pedigree, as illustrated in this chapter where a sample pedigree of a closely inbred animal is shown and also another pedigree of a strongly line-bred animal.

Cross-Breeding.—Strictly speaking, this is understood to mean the mating of two animals that are of pure breeding but of different breeds, as crossing a Berkshire boar on a Poland-China sow, or any other of the pure breeds bred together. Cross-breeding from the feeders' and farmers' standpoint produces in the first cross a very superior feeding animal, often the produce being better for pork purposes than the pure-bred but it must stop at the first cross; by further crossing, the animals deteriorate and the result is the reversion to the scrub. It is not generally customary to do any cross breeding except for experiments or special results in the first cross.

FAIRFIELD RIVAL 112412 is an intensely inbred animal and a careful study of this boar's pedigree may not be out of place.

You will note that the sire of Fairfield Rival was Lord Premier's Rival, a son of Lord Premier, and that Lord Premier's sire was Baron Lee 4th. The dam of Lord Premier's Rival, was a daughter of Baron Lee 8th, a full brother of the sire of Lord Premier, and the next dam, Artful Belle 30th, was a daughter of Lord Premier.

Notice also how the dam of Fairfield Rival is bred. She is a daughter of Premier Longfellow, who was sired by Baron Lee 6th, a full brother of the sire of Lord Premier, and Premier Longfellow's dam, Duchess 222d, was a daughter of Lord Premier. Her dam, Duchess 279th, was a daughter of Lord Premier, and was out of a daughter of King Lee 2d, a full brother of the sire of Lord Premier.

No matter how you trace the breeding of Fairfield Rival it traces directly to one family, that is, Lord Premier or his sire, or full brothers of his sire.



PLATE XII. Concrete Dipping Tank

CHAPTER XIV

SELECTING A BOAR FOR COMMON SOWS

There are thousands of pure-bred boars bought annually for use in the herds of farmers who do not care to grow hogs except for the open market, and while the selection of a boar for this purpose is of much importance, yet it is not so necessary that the buyer should be a student of pedigrees as in the case of the breeder of pure-breds, but it is of vital importance that the farmer buy a pure-bred boar and that the boar be not only well bred but a good individual of the easy-feeding, early-maturing sort, and himself vigorous and masculine. Such a boar will add several times his cost in the feeding and quick-maturing qualities of his pigs from common sows. Sometimes conservative farmers do not like to pay the price asked by breeders for their good hogs, yet I feel sure it is false economy, as the better ones will prove the most profitable. I once saw a farmer outbid a breeder for a good boar, and he got him at a higher price than many breeders will pay, saying, "I never stop at any reasonable price for a good boar to sire pigs for the market." This man was a breeder of pure-bred cattle and knew the value of a good sire, and bred and fed hogs at a profit.

Buy the Boar Early.—To the farmer who wishes to purchase a boar for use as a producer of good feeding hogs for the market, I would urge that he not wait too long as many do, but that he buy the boar early, while the herd from which it is to come is not all culled, so that he may get a better choice and the pig may become accustomed to his new home long before he is to be used.

When the pig first comes to his new home he should be given a good-sized grass lot to exercise in; a dry, warm place to sleep, and where other pigs or hogs cannot worry him by running along the division fence. Take good care of him, feeding a good ration that will make him grow rather than fatten him. Give him plenty of good, clean water. Handle him as frequently as possible that he may become gentle. A boar can run with sows under proper conditions, but I have known men to buy a boar, and as soon as he arrives turn him in with a lot of sows, and they would almost ruin him, chasing him about the lot until he would pay no attention to them, and the result would be a letter of complaint to the seller, claiming that the boar was no good. Many a good boar has been replaced for no other cause than poor judgment in starting to use him. We replaced one a few years ago, and this discarded boar got ninety-six pigs for a neighbor who took him at our request. A man must have "horse sense" if he is a successful hog man, and he must use it at all times. A boar pig at \$50 to use to produce pigs for market will add value enough to the pig crop that he gets, to pay for two or three such boars—value in finish, feeding quality, uniformity and color, all of which go to help top the market when they are sold.

CHAPTER XV

FEEDING FOR MARKET

The matter of feeding hogs for breeders has been touched on in this book in another chapter, but it would be well to say something along the line of feeding hogs for market. It is the general custom where hogs are fed for market to run them together in larger numbers than where they are fed for breeding purposes only, and for this reason the system of feeding may be a little different.

In growing hogs for market it is quite important that the litters come as nearly at the same time in the early spring as it is possible to have them, that they may be uniform in size when the marketable age arrives. These pigs should be fed lightly while suckling the sows and not weaned any earlier than ten to twelve weeks old that they may be well on in the process of feeding, and after weaning should be placed in a first-class pasture where the grass is fresh, thick and green. Clover of course is one of the early things. Possibly the fall sown rye should come on first; a pasture of this would be a grand place to start the pigs after weaning. They should, however, have a good ration of some kind of flesh producing feed, grains that are produced on the farm if possible, adding to this as they develop some shelled corn soaked for about 12 to 14 hours; enough to keep them growing and developing at a rapid rate.

After the rye pasture then a choice clover pasture or alfalfa which is still better. Later a field of rape sown early enough so that it will be several inches high before the pigs are turned into it. This would furnish them a very satisfactory green feed for the balance of the season, or until time to begin feeding green corn of some kind, preferably from a field of evergreen sweet corn, which when planted in the northern country, would be ready the 1st of August. This is a great feed to put on growth and flesh but should be fed with great care until the pigs become used to it, as it is apt to scour them if fed too liberally at first. This will last until the field corn is in good condition to commence feeding.

Ill-Effects of Overfeeding.—I am practically sure that much of our so-called hog cholera in the early months of the fall or late summer, is nothing more than a condition brought about by overfeeding green corn when it is in the roasting ear stage. Pigs that have been fed possibly on scant feed during the summer and that are in rather thin condition would, if given too much green corn in its early stage eat much more than they could properly digest, bringing about a condition that leaves the pigs ready to take any disease that comes along. If they are troubled with worms at this time, and the worms are not expelled, they will die about as fast as if they had the cholera.

Pigs handled as above mentioned from birth, should be ready to market at any time after seven or eight months of age, as suits the owner, or could be carried along until late fall or early winter, but should be marketed before cold weather comes on. It is not so easy to make rapid gains in cold weather as during the early fall months. Pigs handled in this manner should top the market whenever they are shipped.

Of course they should be as well bred as possible from high-grade sows and pure-bred sires to make the best gain, and should also have other attentions such as either good bathing pools made of cement, as described in this book, in which they can lie during the hot hours of the day, or should often be run through the dipping tank, or should be sprayed with some good disinfectant to which crude oil has been added, thus keeping them free from vermin, the skin in good condition, and assuring good health.

The mixture of mineral matter mentioned in another place should always be before them under cover where they can go and eat when they desire. They should be kept free from worms. This may be done by various methods as herein described.

Porkmaking Profitable.—The feeding of hogs for market will be found one of the most profitable departments of the farm, and with as little trouble as anything could be for the amount of money it will bring in, and quite a large number of hogs might be fed for market on every farm even if it be a small one, and if one will be sure to have his hogs inoculated with both the virus and serum, known as the simultaneous treatment, before they are even exposed to cholera, he need have no fears of losing them, provided the work is properly done. They may become slightly sick from the treatment at about 14 to 15 days after being treated, but it will soon pass off and the death loss should be but little if any. The writer knows one party that had 3,000 inoculated and lost but ten from the treatment. In our own herd in 1913 we inoculated 219 and lost but four which were quite young and probably got a little larger dose of virus than they could carry.

Value of Uniformity.—If one thinks that all kinds of hogs will sell for the same price on the market, just let him ship a carload of even weight and uniformly colored pigs to any market and watch them sell in comparison to a load of mixed breeding, colors and weights. He will then be fully convinced that it pays, and pays well, to use a good pure-bred boar for producing pork hogs. The writer once shipped a carload of short year-old hogs to the Chicago market that averaged 409 pounds on the scales there. The shrinkage was but 80 pounds on the whole load, and they brought 25c per 100 pounds above the top of the market that day.

Why? Simply because they were as alike as a lot of beans, and were so well finished that there was little shrink in them.

It is a well known fact that quality counts in any market and with any kind of stock or other produce of the farm.

CHAPTER XVI

FEEDS AND FEEDING

Under this head comes tankage, which is the by-product of the packing house, made up from various waste products steamed to a high degree of heat, after which the liquid is drawn off and the residue dried and ground into a fine meal. Meatmeal is practically the same thing only wholly made from meat scraps. Both of these feeds are extremely high in protein, which is a very necessary element combined with other feeds to make up a balanced ration.

From 5 to 10 per cent. of 60 per cent. protein tankage is generally sufficient to balance a corn ration for swine. I have mentioned the use of tankage in several places in this book.

There is another variety of meatmeal which the writer has used quite extensively. It is purchased from the large butcher shops, or from the small packing house near home where a few hundred hogs are slaughtered daily, and is known as "cracklings," being the compressed part of the fat after the lard is pressed out by hydraulic pressure, and usually comes in cakes of about 125 lbs. each. We purchase these cakes half a ton or a ton at a time, break them up into small pieces with an axe and run the broken pieces through our steel burr grinder, making a finely ground article of pure scrap meat. We add about five percent of this to a pig's ration, and it is certainly relished by pigs of any age. It keeps the bowels open and in nice condition, makes the hair glossy and is of great value.

Hogging Down Corn.—Some farmers and perhaps breeders of pure-breds, practice the custom of "hogging down" a field of corn. If this is to be done—and it is a good custom—it would be a very great help at the time of the last cultivation of the corn to sow some rye or rape, or both, in the corn and let it get a few inches high by the time the hogs would be turned into the corn. This would be a help in balancing the ration. It is also well if the field of corn is adjoining a clover or alfalfa field, as either would have the same tendency to make a quicker and a cheaper growth than would the corn alone. If the field is large it will be well to fence off by some kind of temporary fence, a portion not too large, and let the hogs have that until it is well worked down, preferably by the older hogs that would be ready for market first and followed by the younger hogs or shoters that do not need so heavy a feeding of corn. This is a very economical way of finishing up a bunch of hogs for the market.

Prof. W. J. Carmichael, formerly of the University of Illinois, and now secretary of the National Swine Growers' Association,

states that a field had been planted with corn continuously for 33 years and every year was "hogged down."

Within the last year or two the owner desiring to learn the condition of the soil and how much corn this particular piece was producing after having been planted to corn for 33 continuous years, measured off a piece before turning in the hogs, and by actual measurement learned that the land was producing over 100 bushels of corn to the acre.

It behooves the thinking farmer to keep up soil production, especially during these days of high priced land, and this can be done profitably and economically by "hogging down corn," especially if rape or some of the clovers or other grasses, or some of the grains like rye, is sown in the field when the corn is laid by. This will give a good balanced ration, and the hogs will do the harvesting themselves without cost to the farmer, and will doubtless, taking one year with another, bring up the selling price of his corn.

Comparison of Practices.—I have a friend who made a comparison between "hogging down" part of a field of wheat, in 1913, and cutting the other part of the field, threshing it and hauling it to the elevator and selling it at 80c per bushel. Estimating the yield of the entire field the same, the portion that he "hogged down" after weighing the hogs when turned into the wheat field, and again when the wheat was all eaten and the hogs sold on the market, he found that his wheat that was "hogged down" brought him \$1.40 per bushel compared with 80 cents per bushel for that threshed and hauled to market. Further than this it required no expense to market the wheat that was "hogged down," and it also benefited the land to have the hogs on it. There are many little things in the hog business if one will try them out that are not only more economical but much less work than old methods.

Of course where men are breeding hogs of the pure breeds, to be sold as breeders, it is necessary that the animals should be in good flesh and prime condition at all times, to be ready for inspection by visiting breeders. With such animals additional care and feed may be necessary. Certainly it is a good plan to have everything in the hog line at least in good breeding condition and always ready for inspection.

Green Feed.—Every breeder or feeder should know what are the best grasses, grains and other feeds that can be grown in his locality, and can easily get this information from his state agricultural college, and should use his judgment in selecting those that are best. The essential thing is to have plenty of green feed at all times of the year if possible, either for grazing or that can be used during the season when there is no pasture, as in our northern and western states. In portions of the country where roots are grown to some extent, such as mangels, turnips, sugar beets, etc.,

they can be used with success as a succulent feed during the winter months, but my experience is that the average farmer or any help that he can hire will do mighty little getting down on the knees to work among roots of any kind, which is necessary in order to thin out and keep clean from weeds until they become large enough to be cultivated in the proper manner, so the root question with us has never, with the exception of one or two years, been considered in our ration for succulent feed, preferring to use the last cutting of green alfalfa instead. Let me emphasize the great importance of pasture and succulent feed at all times.

Cooking Feed.—It is a well-known fact that the nutriment in feed for swine, or its value as a flesh producer, is not increased by cooking; but it is also a well-known fact that during the cold months, at least in the northern states, much benefit is derived in feeding Fall pigs and others not well on to maturity, a warm feed rather than one mixed with cold, icy water.

There are some kinds of feed, however, often fed during the winter that require thorough cooking; particularly is this true of potatoes, which some people use when they have a quantity of small ones sorted out from the regular lot. Potatoes are of little food value unless thoroughly cooked, and when so cooked and mixed with corn meal and other ground grains are really a valuable adjunct to the ration. Shelled corn is often fed to young pigs during the winter, and this is much improved by being steamed until soft, then cooled down to the proper temperature for feeding, but such matters will be treated in another chapter.

For Fall Litters.—We have for many years made it a practice to feed fall litters (either not weaned or recently weaned) during the entire winter on a feed mixed with hot water that would make it quite warm for the pigs when poured in the trough. For this purpose we have used a boiler of about ten-horse-power capacity, in which steam can be raised in a very few minutes, with pressure enough to heat several barrels of water. While steam is getting up the water is let into the barrels or mixing tank, which, in our case, is on wheels and divided into four compartments, and as soon as steam is up the hose is turned in and in a few minutes the water is as hot as necessary. We then mix in the feed, perhaps of several different mixtures in the four compartments, to accommodate the animals of different ages and conditions. This is fed and quickly eaten, when the pigs go back to their warm sleeping houses, thoroughly satisfied and contented. Whereas, if cold or ice water was used, it would require most of the day for the animal heat to warm the pig up to its normal temperature, thus taking more feed and giving far less satisfactory results.

There are various methods of getting hot water for the purpose of mixing the feed for pigs during cold weather. There is manufactured a very desirable outfit for heating water by process of steam, with an attachment to temporarily or permanently warm

farrowing pens. We speak advisedly regarding this cooker for the reason we formerly used two of them, but in later years thought we needed a larger affair and purchased a ten-horse-power steam boiler, which has proven a great success.

There are other kinds of hot-water heaters made for this purpose, as well as the old-fashioned kettle set in a stone arch, which will do where but little water is needed, but it would be entirely unfit for furnishing hot water for a large herd.

The kind of steam generator or hot-water heater is immaterial so long as it does the work and furnishes enough for mixing the feed for the herd, but I must insist that, for young pigs before and just after weaning, warm feed is necessary for best results and is of equal value for young shotes.

When the hogs are well matured it is not necessary to give them this extra attention and they can make good growth and development on dry feed, where plenty of pure water is supplied for them. This saves much labor and prevents the freezing of swill in troughs.

Of course the breeders in the southern states and the warmer countries are not supposed to have this extra expense in warming feed, yet even in such states there are times when warm feed would taste wonderfully good to a pig from a late fall litter.

Soiling.—Where large numbers of hogs are kept on a small farm, it is sometimes quite convenient to have small plots of green feed that can be cut and fed in the troughs or feed places where the hogs are kept. This method of feeding green feed is known as "soiling." For instance, take a small patch of fall rye, which is about the earliest green thing to be found in the spring, and when it gets up a few inches high it can be mowed off in small quantities daily and fed to the hogs in their regular feeding places while fresh and green. A very small piece of ground in this manner will furnish a large amount of green feed. While the green rye is being cut off some other crop can be planted or sown such as rape for feeding after the rye is gone and the clovers are dried up. A small patch of alfalfa adjoining hog pastures would also be of great value; this could be cut and fed green, and a very small patch would feed a large number of hogs, for some time. By feeding it in racks such as described in this book, there would be very little waste from soiling.

Crops to Feed Green.—After rape once gets a good start and becomes large enough to mow and feed as in the above manner it can be recut as fast as it grows up to the proper height, all through the season until freezing weather comes. A small field of evergreen sweet corn can be handled in the same way. As soon as the ears are formed and are of proper size for roasting, this may be cut and given to the pigs daily in small quantities at first, increasing as they become used to it, until they can have all they will eat up clean. I believe soiling can be practiced with economy,

especially where hogs are kept in separate lots and could not be placed in a pasture. Besides there would be no waste from soiling as none of the feed would be injured by the animals walking over it. We have never practiced this system to any extent, but believe it could be made one of the best ways of handling green feed where one did not have suitable pastures for each lot.

Roots could be handled in this way also, but would not be necessary except for winter, when green forage was impossible other than alfalfa, cowpeas and clover.

How to Make Cob Charcoal.—As charcoal is a very desirable supplemental food for pigs, it is well to know how to make a good article and cheaply, particularly in the cornbelt where there are more or less cobs after corn shelling season.

Dig a hole in the ground about six feet deep, and four or five feet across, bricking it up with fire brick so there will be no danger of its caving in or becoming broken up. Build it up to a level with the ground and have a heavy galvanized iron cover made large enough to cover the pit tightly. Then take a double wagon box full of dry cobs and start a little fire in the bottom of the pit, adding a few cobs as fast as those in the pit begin to burn and come to a red glow—actually burned to a charcoal—yet looking bright red. As fast as this condition appears in the pit add a few more cobs, until the entire pit becomes filled to the top with a glowing mass of burned cobs. Then have handy a few barrels of water in which salt is dissolved and sprinkle it on this pit of burning, glowing cobs until the fire is entirely extinguished. Then cover the pit with the iron cover, packing a little dirt on the edge so no air can get in the glowing mass, and leave it until the next day, when the fire will be all gone and the pit full of charred cobs in a condition where they can almost be crushed with the thumb and finger. Let it stand until you know it is absolutely cool before feeding, then put a bushel basket full in every lot where there is a sow and litter or where there are eight or more pigs. It will be surprising to you to see how eagerly this is eaten by pigs and hogs of every age and condition. They seem to relish it very much and it acts as a corrector of acidity. This is a good thing to have on hand at all times if possible. Good charcoal cannot be made by raking up cobs from the feed yard and burning them in the open air, for the reason they will either all burn up to ashes, or if put out with water, will leave many of them simply scorched and not burned to charcoal.

Pig Meal.—For many years we have been experimenting with different rations for pigs, and are now perfecting a pig meal which is giving splendid results, and can be fed not only to young pigs but to older animals as well.

Housecleaning.—Besides the matter of keeping all sleeping pens and feeding places clean, it is well for the breeder to look

carefully after the premises in general by having a regular clean-up at least twice a year, buildings, yards, fences, etc. This would not only give a good appearance but would be a benefit along sanitary lines. There are many good disinfectants and some should be used weekly, by spraying the troughs, feeding utensils, mixing barrels, etc., as well as the feeding floors and sleeping places. Feed yards should be well cleaned up and kept free from cobs and other accumulations. These are small matters, yet quite important and should be carefully looked after.

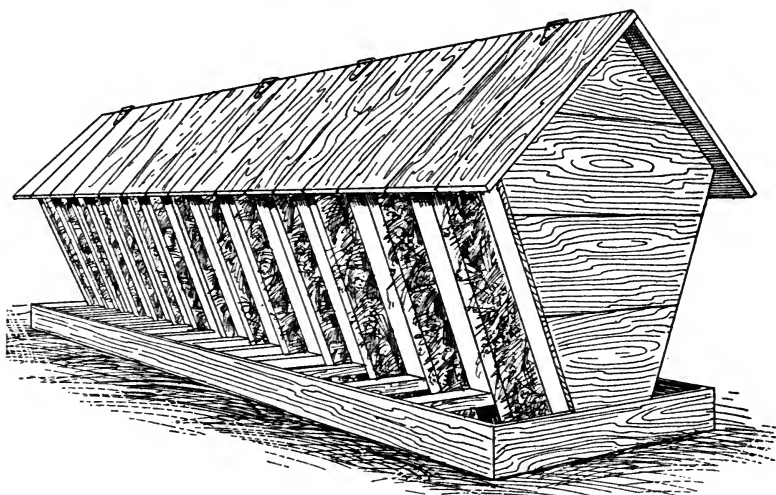


PLATE XIII. Convenient Rack for Feeding Alfalfa

CHAPTER XVII

ADVANTAGES OF SHOWING

For the breeder of pure-bred hogs who wishes to establish a substantial trade, it is very necessary that, as soon as he becomes well versed and properly started in his breeding line, he should make it a practice each year to fit a show herd. Possibly at first it is as well for him to prepare only for county shows, until he thoroughly learns what is required to win at the big shows and expositions. There is no way, in my opinion, in which a young breeder can so quickly get before the people and started to selling his hogs for breeders as to annually fit enough animals to fill the classes usually provided for in the various premium lists.

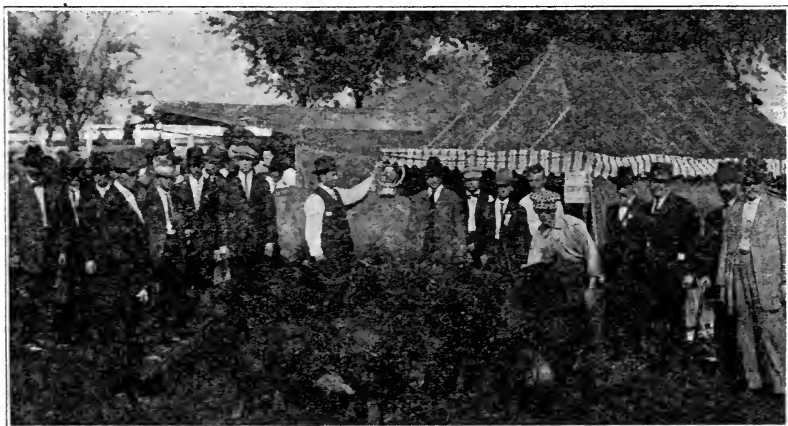
The reason I suggest that the beginner commence his show career at the county fairs, is from the fact that I passed through all these little troubles when I was a great many years younger than I am now and know what the difficulties are for a beginner. It is hardly expected that a young breeder who has never followed the practice of showing, and who has probably not spent a very large amount of money in the foundation of his herd, can win at state fairs and expositions where only a few great show animals can get the money. Let the county fairs be the stepping stones to larger ones where it requires, practically speaking, the P. T. Barnums of the business to win.

Never will I forget the time way back in the '70's when I made my first show at a state fair. It was at the Illinois State Fair when it went around on wheels, and that year was located at Freeport. I had only been in the business a year; knew nothing of what it required to even have a chance of getting into the money; but nevertheless I was full of enthusiasm and overflowing with ignorance. I fitted up a portion of a herd which I thought was "some pigs" but found, much to my profit eventually, that they were only ordinary. Starting out with much pride and having already figured the amount of money I would bring home by adding up the amounts in the premium lists, I found after the fair was over, that I was really a wiser man and richer in knowledge, but poorer financially than when I arrived on the grounds, beaming with confidence. I did not even get in sight of the premium money. Those were the days when a young breeder was hardly noticed, but, being made of the kind of stuff that never gives up, but sticks, I did not parade the grounds condemning the judges for lack of knowledge, nor inform the managers of the state fair that I would never show again at their fair; but quietly studied the conformation of the animals that were good enough to win, then returned home with the determination to come a little stronger next year.

This was followed up several years before getting much above the white and yellow ribbons. The only blue thing I found in those days was my feelings in not being able to win. This is where I made a mistake by attempting, ignorant as I was, to show at the great state fairs, rather than starting at county fairs. But the determination was in me and the show ring was followed, as large as it was and as great as the shows were, from 1877 until 1893, when the climax was reached at the Chicago World's Fair. As I grew in knowledge and experience each year, I was able to win a few of the better prizes and as the years came and went, won more prizes, until it was a pretty sure thing when I started out on an eight weeks' trip to the big state fairs, that I would win money enough to pay all expenses and more and be benefitted greatly by building a substantial acquaintance among breeders in our line.

The trade grew annually and after winning the grand championship at the World's Fair in Chicago for the best herd, consisting of one boar and four sows, over one year old, my name was finally placed on the map and my son and I have practically discontinued showing since that time.

I strongly urge the show ring as a means, not only of education for the breeder, but of building up a substantial business.



CHAPTER XVIII

SELECTING AND FITTING THE SHOW HERD

The selection of the show herd requires a knowledge of what it takes, when well fitted, to win. One should commence months in advance of the show to make his selections, first making up his mind whether or not he wishes to fill all the various classes listed in the premium lists, which are now so made up that the same animals can show throughout the circuit without being required to carry along other animals of various ages from those first selected to fill the classes.

In making the selection for the show herd, commence first by selecting the animals that are required to show in the "aged class."

The aged sow class should be made up of animals that have proven themselves breeders and should show by their appearance that they have been breeders. Let them, however, be well fitted without overdoing and as uniform as possible in type and conformation, with an aged boar of the same general type, showing that he has been a breeder, only of a more masculine appearance, thus making up a desirable herd for the aged class.

The tusks of the boar should be removed before starting out on the show circuit and should be so closely cut that no trace of the same can be seen. This should be done both for the safety of the caretaker and those about the show ring.

Next, select the senior yearlings, a boar and three sows—which should carry as much size, or nearly so as the aged herd, but would naturally be somewhat smoother owing to the difference in age and previous service. Be sure that these are also uniform in type with the aged herd.

Next select the junior yearling—a boar and three sows, which are, generally speaking, the sweetest things in the show ring, and being at an age that shows full development and yet not required to have produced any offspring, naturally will be much smoother and more in bloom. This class is usually the best of all at any breed show. These should be of the same general type as the older ones selected, and should be in the pink of show condition—well developed at every point—carrying all the flesh that goes to make an ideal show animal, yet under no circumstances to be overly fattened or fleshed to a condition of unevenness or roughness.

This same careful selection must be carried out also in the boar and three sows under twelve months of age. This is really the hardest class to fill satisfactorily. First, for the reason that the young boar over six and under twelve months of age is passing

through a crisis in his development; this being an age that almost invariably, if the boar is a vigorous one, finds him fretting and champing more or less when in sight of other animals. The sows, also of this age, are harder to properly develop and bring out in their best form, as they too are passing through a period of life when there is more or less restlessness and excitement than when older.

Some people greatly enjoy bringing out a pig herd, under six months of age, as there are often enticing prizes offered in this class, and it is a good way to show the class of pigs you are producing. While this class should also be as uniform in type and conformation as the others, and should be well fitted in flesh, care should be taken that they are not pushed too hard and become overdone, and more or less wrinkled in appearance.

Fitting the Show Herd.—We will now suppose that the herd has been selected along proper lines and we are ready to start the fitting process with a bunch of animals of the same type. The question now is how to fit these animals to the best advantage without overdoing them, so they will show when the fair season opens, in the best possible bloom.

Always remember that "bloom" is a desirable thing in a show animal. When "in bloom" a hog is at its best and this "bloom" only lasts for a short time, and is as easily lost as the bloom of a ripe peach, hence the matter of fitting should commence in time and be carried on in a manner to have the animals "in bloom" when the fair season opens.

For convenience in handling and caring for them, the show animals should be kept by themselves and not allowed to roam with the general herd. The four boars being fitted for the different herds should be carefully prepared and put together in one lot where they can be fed and handled together so that there will be no danger of their fighting should it be necessary to drive them to or from show building together. The aged sows, the senior and junior yearlings, should also be fed and kept in one enclosure for best results during the fair circuit, when it is necessary to exercise them mornings during the show season. The over six months and under six months sows can also be kept together for the same reasons.

The yards or lots, where the animals are to be fitted during the next few months, should have an abundance of succulent pasture, either natural grasses or other green forage crop provided and each lot should have a water fountain that should be kept well supplied with pure clean water at all times. Of course ample shade should be provided—either natural or artificial—and no dust should be allowed to accumulate where these animals lie in the shade. If possible, a cement bathing pool large enough and deep enough in the deepest part to practically cover them should

be provided, in which the water should be changed every few days, always remembering to add a little disinfectant and crude oil to the water, preventing any skin troubles or lice.

Feeding the Herd.—When one starts out to fit a herd of show animals for the large fair circuits, the matter of expense must, in a measure be forgotten as these animals should have the best feed possible to put them in just the right condition to show all that is in them. We have found, when fitting animals for show, that we have to make some changes in our regular grain mixtures for best results. I have found nothing better in this case than to feed a nice rich slop feed, made up about as follows:

For the older animals above one year I would use equal parts of finely ground corn meal and the best quality of white heavy middlings, with an addition of ten per cent old process oil meal, thoroughly mixed together before being wet, and if sweet skimmed milk or that from the separator is possible to be had at any reasonable price, the feed should be mixed with this and all feed in a sweet condition. If it is found impossible to get milk, add tankage to the oil meal (eight to ten percent oil meal and five percent tankage), and the mixture of meal and middlings, and mix this with fresh water and feed it after it soaks a few hours—but never allow it to become sour.

Two Feeds a Day.—I think two feeds a day, even in the fitting of a show herd, is as good as three, generally; however, it would be proper and perhaps as well to give these animals a little soaked shelled corn that has soaked long enough to become soft, as a noon-day meal. Where this is done, the morning and evening feed can be fed a little earlier and later, respectively.

For the younger herds of over six and under twelve months, as well as the herd under six months, I should certainly urge the use of skimmed sweet milk for best results. I have known showmen, while fitting young pigs, to feed whole milk fresh from the cow. This is entirely useless and, I think, is one of the surest ways of overdoing the pig and causing him to break down in the pasterns and it is also almost a certainty that pigs fed fresh warm whole milk will become more or less wrinkled, but skim milk is not so apt to cause this trouble, and this is especially true when well balanced with the ground feed.

Always remember, however, that too much milk is worse than none. The proper amount is three pounds milk to one pound of grain; with this your ration is practically balanced or at least gives the best results.

Condiments.—If any of the animals at any time during the fitting do not eat with as much relish as would seem best, there are many kinds of condiments that could be used to make the feed more palatable. A sufficient amount of brown sugar or

black strap molasses to well sweeten the mixture, will make the feed much more palatable. This would be the case even when milk was used instead of water in mixing the feed.

I would, by all means urge, while fitting these hogs for show, that a mixture of mineral matter (mentioned in another part of this book) be used. It may be well to mention here that this should be made up of ground limestone, with perhaps some slacked lime, together with ground phosphate rock or any other material that would contain plenty of phosphate and the whole mixed with salt to make it more palatable. I urge the use of this material so that while fleshing these animals there would be no danger of breaking down the bone, as the mineral matter is essential for bone growth.

If any of the younger animals in the show herd were inclined to be a little weak in the feet or pasterns, I would buy one hundred pounds of finely ground bone meal or bone dust and mix it with the mineral matter or even add it in small quantities to the slop feed.

Exercise Necessary.—Much care should be taken in fitting the show herd not to break them down, and as a help in this matter as well as in keeping them in better condition, it is necessary that the show herd be given some special exercise other than that which they will naturally take in their enclosure. By taking the three older boars out each day and driving a half mile or more you will not only have them under perfect control, but will also have them in a condition to show at their best when driven in the show ring, and the same is true of the show sows and even the under a year herds.

We have all noticed, while standing about a show ring and watching the animals come in from their pens, that many of them, while in good flesh, are not really in show condition, for the reason that they cannot walk with ease and grace but wobble around. A show animal should not be so heavily loaded with fat as not to be able to walk with ease and comfort. It is not always the amount of flesh that an animal is carrying that makes it show at its best, but the smoothness in which it is put on and the ease with which it is carried.

It is my opinion that what is known as "strong breeding condition", that is, flesh enough to round out every point without overloading, is the proper show condition.

What I have said about the feed to be used in fitting the show herd, need not be considered as an absolute iron-clad rule. Any of the mixtures of grain, grasses, etc., that will come close to being a balanced ration is all that is necessary. I merely name these feeds as among what we have found to be the most satisfactory. The real object is to feed what will flesh them rapidly and not add too much fat, but more red meat or flesh.

Finishing Touches.—While fitting the herd for the show ring they should be handled daily by the feeder, by brushing them a little or scratching them and coaxing them to lie down where he can handle them about the legs and feet, so that when you are ready to trim the toes and hoofs into nice shape they will not get excited, but will lie quietly and let you work over them as you wish.

The foot and pastern of the show pig can be improved one hundred percent by proper trimming. When the pig is lying down, quietly take the foot in the left hand and with a very sharp knife trim the lower edges off the hoof, commencing well back and following around the entire hoof, shaping the toe up as close as possible to the fleshy part of the foot without injury. If the dewclaws are of unusual length these too can be shaped up at the bottom and pared down to proper shape. All this work should be done at odd times before starting out to the fair.

A nice brushing every day or two after sprinkling with disinfectant and crude oil is very essential, not only to make the show herd quiet and docile, but to improve the condition of the skin and hair. All this is a help in shedding the old coat. The earlier this is commenced in the preparation of fitting a show herd the better. Every animal except the under six months pigs should shed off his or her old coat not later than the first of August, that the new coat may be nicely started before the fair season opens. Generally all this will come along in due time if the animals are fed as above and are gaining in flesh constantly. If any of the herd should not begin to show inclination to shed by the middle of June or the first of July, I would give them a wallow hole in which some clay has been placed, if it is not naturally a clay soil, keeping this hole rather thick in mud, and adding some wood ashes.

Clipping the Hair.—Many showmen are in the habit of clipping the hair of their older animals when they do not shed off in time. While this, in some instances, looks better than an extremely coarse coat of hair, it always shows every little unevenness in the flesh of the animal. This practice is more common among the Poland-China showmen than any other breed I believe, yet I have seen some show animals come into the ring that were closely clipped, showing almost no hair and sprayed in oil, that really I think were not showing as well as though not clipped, for the reason that little uneven places could be plainly seen along the back and sides, evidence to the Judge that they did not flesh evenly as they should, and would in a way, militate against them.

Before entering the show ring or as early after arriving on the fair grounds as possible, the herdsman should take a hand clipper and clip the long hairs off the edges of the ears and about the nose and jaw of the hogs and also clip the tail clean from

the brush back to the tail head, giving a much more finished appearance to the animal than though this was neglected. The above suggestions properly followed and the bringing of the herd to the shows in a thoroughly docile, well mannered condition, add much to their credit while in the show ring. It is pretty hard for a Judge to properly examine an aged boar or one even younger, if he is brought into the ring with four or five men, each bumping him around with a short hurdle—the boar certainly is not showing to the best advantage.

Dressing.—A nice dressing to use after the hogs are fitted and in show condition, before entering the ring, is made as follows:

Take a good quality of cotton seed oil, adding enough wood alcohol to thoroughly cut and make a nice thin easy running dressing. After the hog is thoroughly washed and his skin is clean apply with a brush and rub it in thoroughly.

One of the most detestable dressings that I have ever come in contact with as judge at the great shows is made of oil and lamp black. The animals, as they come into the show ring, are not only a mass of grease and lamp black, but the attendants are about as badly blacked up as the hogs, and before the judge is half through he is also more or less greased up. I have known of cases where the judge had to send his clothes to be cleaned each night or put on a clean pair of overalls each day. All that is necessary as a dressing is something that will make the hair glossy and yet not be gummy.

Exercise on the Show Circuit.—The good herdsman and caretaker does not lie in bed until late in the morning, but is up early and has his show animals out on the grass somewhere about the fair grounds, and drives them around for an hour until each animal is thoroughly emptied out and has had proper exercise.

CHAPTER XIX

HANDLING SHOW HERD IN THE RING

The proper fitting and handling of the show herd before it starts out on the circuit, will prevent much trouble in handling the animals in the ring.

With the herd properly trained, there is nothing with which to handle them compared with a buggy whip, in the hands of a man who has sense enough not to whip the hogs, but quietly touch them on either side of the head to place them where he wishes. As a matter of fact this has been my experience in the many years of handling show hogs. I never need a hurdle with our hogs. With some breeds it is absolutely necessary to have a hurdle in handling a mature boar even though he is supposed to be well mannered and docile, but there is no excuse in using a hurdle with a bunch of sows if they are half way prepared before starting on the circuit. When a hurdle must be used, let it be a light one and made so that the hog cannot see through it. Don't make it of narrow slats a few inches apart, but cover it with heavy material, or else make it of boards tightly matched so there can be no seeing through it. When in the ring with the herd or a single animal, show to the best possible advantage. The showman has this privilege.

Feeding on Circuit.—Many exhibitors seem to think that when they start out on the show circuit they must stuff the animals with all the feed possible, not only during the time they are on the cars going to and from the shows but each day while on the grounds. It has been our experience that the man who follows this custom generally arrives home with his hogs much lighter in weight than when he started out, while if the hogs had been given only water to drink while en route to the shows and fed lightly for the first day after arriving and given plenty of exercise, they would wind up the circuit in much better condition than if they had been stuffed all the time.

I have known an exhibitor to buy warm milk from some of the dairymen and feed his pigs all they could hold, though they had never had a drop at home while being fitted. This generally results in a case of scours with the pigs "off feed" for several days and by the time they go into the ring they are badly gaunted up. Of course if the pigs have had this ration at home it should be continued. Avoid radical changes in the rations.

Treatment of the Herd on Its Return Home.—Many successful exhibitors, when they have finished the show circuit, won their laurels and arrived home safely with their herds, seem to think that the animals now need no further attention, except feed.

This is a great mistake, and if these show animals are expected to go on and prove what they should be, desirable and regular breeders, they must be handled very carefully.

The first thing I would advise on return from the shows, would be to quarantine the show herd on a portion of the farm or some other place where they would not come in contact with the home herd. They should be placed on good, green, succulent pasture, if possible, and if not possible, should have some kind of green feed to take the place of pasture. They should be fed quite a little less than while on the show circuit, and no fat-making feed, and be made to take all the exercise possible, so that they may be reduced in flesh somewhat—not by starving, but by lighter feeding and abundant exercise—and if they have not been too strongly fitted, they will soon be in prime condition to breed.

The show herd should be kept in quarantine about three weeks, and if no symptoms of disease appear by that time, it would be safe to put them with the home herd.

Now that we can procure a reliable hog cholera serum I would advise all hog men making the fair circuits to give each show animal a large dose of serum (no virus) about a week before leaving home for the fairs, unless they have positive knowledge that every animal in their show herd has been properly and permanently immuned by the simultaneous treatment.

A large percent of bran and oats mixed with a small amount of middlings and cornmeal is an excellent feed to use during the reducing period. They must have exercise and if necessary see that they get it by driving daily. This is very important and must not be overlooked.

A part of the ration may consist of whole oats scattered freely in a clean place, as the oats themselves are an excellent feed, and they will get considerable exercise while eating them.

I might say right here that with many exhibitors it is a custom to breed the show sows a month before starting out on the fair circuit, and if successful in settling them, so much the better, even though the litter comes at an unfavorable time of the year. It simply keeps the animals breeding, and it is much better for them.

CHAPTER XX

TO THE EXHIBITOR AND FAIR MANAGER

The wise exhibitor or herdsman will so arrange his circuit that he will arrive on the fair grounds as early before the opening of the fair as possible, that he may have his hogs well rested and in the pink of condition before the show opens. Where one attends a fair each week, this of course is sometimes a hard rule with which to comply, but many thinking fair managers today are so arranging their dates and days of show that the live stock that is to show the following week at a distant state is allowed to be released on Friday night—which, by the way, is a custom that all fairs and expositions should follow.

Many state fairs have too many men among their management who know nothing whatever of the needs of the live-stock exhibitor while on the circuit. They manage their show as though it were the only one the exhibitor was going to attend and seem to think that the exhibitor, because he made an exhibition at their fair, should be obliged to remain there until the last man is gone. They should always remember that without the live-stock exhibit their fair would soon be a thing of the past, and for this reason should give the live-stock exhibitor every encouragement and help possible.

Be Prepared to Show Pedigrees.—Oftentimes in the under-six-months class or the class over six and under twelve months, there is such a wide range of sizes that one hesitates in comparing. Here is where every exhibitor should produce the certificates of registry, and if any of the animals have been purchased of others, the certificates of transfer, showing exact age of the animals on exhibition. This would avoid any unpleasantness between exhibitors or between the exhibitor and the judge.

Authenticating Ages.—It is pretty hard for an experienced judge to step into a ring of pigs showing in the under-six-months class and find most of them of proper size and development, and others showing by their general make-up that they are far beyond six months old, even being old enough to show well developed tusks, which every man knows are not developed until after the pig is six months of age. The judge who knows his business, while not inclined to quarrel with the exhibitor over the age of his pigs, will quietly ignore them, not considering them eligible to the class. This, of course, generally causes the exhibitor to complain when he should be quietly informed that his pigs are out of their class owing to age, and unless he can prove by certificates of registry, properly signed by the record association, he should not be allowed in the ring. For this reason I would urge every prospective showman to always start out fully prepared for such

emergencies. Many is the time that I have asked the exhibitor, while acting as judge, the age of his animal; he generally has an answer ready, and when asked if he has his registry papers with him, he replies that he has them at home, but forgot to bring them, and after passing around the ring once or twice, I again ask the gentleman, "What did you tell me the age of this animal is?" and he would give an age entirely different. I have done this on purpose to find out if the man was telling the truth. You know it has been said that it takes an awfully smart man to be a liar.

Again, where registry papers are not absolutely insisted upon, many exhibitors are inclined, when asked the age of under-a-year animals, to give the date of Sept. 1 to 3, as their date of birth, and those in the under-six-months class from March 1 to 3. This of course, has to be taken by the judge as a fact, however much he may doubt or suspect.

This matter of showing pigs of uncertain ages is somewhat in disrepute. It simply puts the man doing business right up against an almost impossible chance of winning, where older pigs than should be admitted to the class are being shown. I know of no way to stop this except by the rigid enforcement of showing certificates of registry.

One may say that the same rascality might be covered up by the owner when sending his pedigree in for registration giving a wrong birth date, showing the animal younger than it really was. When it comes to this proposition the fellow will have to be very smart or he will be tripped up sometime by having registered two litters from the same sow that were born too nearly at the same time.

CHAPTER XXI

JUDGING AT SHOWS

There are many good judges; men who not only know the correct type and conformation of show animals of the various breeds, but are men above reproach and can always be relied on to be absolutely square and honest in their decisions. The matter of selecting the best three or five animals, as the rules in the premium list require, is no small task.

The first thing the judge must do when he steps into the arena is to forget all friends and know no man. He must judge the hogs only and let no personal feelings enter his mind. If his brother or son should be showing in the ring he should be a man of strong enough character to turn down their animals, if not worthy, just as quickly as though shown or owned by an entire stranger.

The judge should not attempt to pass on the animal unless he has in his mind a true picture of what the animal of that age and that breed should be. Of course no animal, even a show animal, is perfect.

After carefully examining each animal of the class under view, and finally deciding which, in his opinion, is the best, let him pass this without further attention and consider which is the second best. It is usually much easier to find the first prize animal than the third, fourth or fifth, but after the judge compares points, conditions, general type and conformation, and has his mind made up, let him line these animals up as first, second, third, fourth and fifth as the case may be, for the clerk to take the entry number and write the proper names and the award in the book. Then he should by all means be ready to compare these animals in the presence of the bystanders, explaining why he gave this one the first over that one and so on. It is surprising to a judge sometimes to find what great satisfaction it gives the exhibitor to be shown where his animal lacked in comparison with the one above him, and no judge should act unless he is able to give the reason.

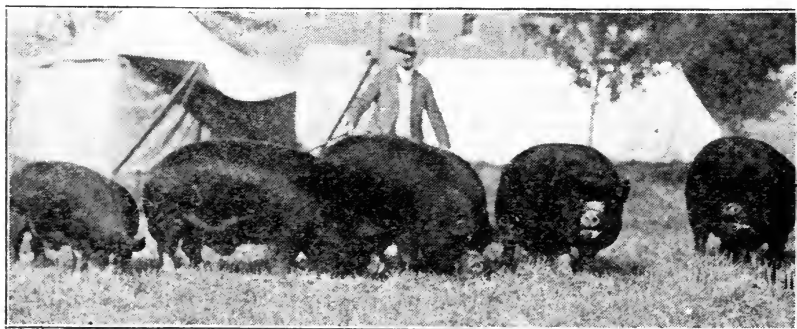
While disliking to speak of myself as a judge, I may be pardoned in saying that I have acted as judge at practically every state fair in the Union and I make it a practice to make this explanation after each decision and many and many a time has the loser come to me and said: "Mr. Lovejoy, I learned more today from what you have shown me about weak points or undesirable ones in hogs than I ever knew before, and I thank you, and I now know I was not entitled to higher honors."

Tricks by Exhibitors.—A judge in a hot ring has many little annoyances; for instance, there is the showman (and it is his right) who brings in an animal that possibly drops a little in the back, with possibly an inclination to sag too much, and while the judge is trying to find this out, the showman is continually bumping the animal on the nose to keep its head down and its back up. It is also amusing often to find an exhibitor who is continually squatting beside or in front of his animal and patting it, trying to attract the attention of the judge to certain points that he thinks might be overlooked. Let me say to this kind of exhibitor that the judge will find all the good points quickly; what the judge is looking for is the weak ones, and if he knows his business he will find them.

Really the best showmen, who are not only good winners but good losers, say very little to the judge unless asked a question, and this is as it should be, for the judge knows that the whole responsibility is on his shoulders and he is willing to take this responsibility without, rather than with, the advice of the owner or showman.

I always like to have the animal that I am judging walk off naturally and without an attendant. I think this quite important, as it will many times show up defects that an expert showman will completely hide from the judge if the showman is allowed to show that animal all the time. With this idea in mind, I invariably stand where I can see the animals come into the ring from their pens.

If you are fortunate enough while showing to win the blue or purple let that joy be confined in your heart; if you are so unfortunate as to lose let that disappointment also be confined in your heart and try to appear a good loser. It really requires a "good sport" to be a good showman, and especially to be a good loser. The judge cannot in his decisions consider the desires or hopes of the exhibitor, but must at all times make the awards according to his judgement and not be influenced by the ringside.



CHAPTER XXII

SHIPPING CRATES

Shipping crates are probably sent out in a greater variety than almost any other article used in the swine breeding business. It is not always the fault of the shipper that he cannot send a better crate or a nicer looking one, from the fact that crate material in many states is almost impossible to be had. At least this is the case in our vicinity. We have no hardwood lumber for sale in our county, neither do we have any old fashioned white pine. We do have southern pine that is so full of sap and knots that it is hardly worth while to use it, and if it is used it makes an extremely heavy crate.

Probably the best lumber from which to make shipping crates is poplar if it can be procured, being both light and strong. Following this comes a straight grained elm, used principally in a half inch thickness, with exceptions of bottoms and corners.

The matter of crating hogs, where there are many to ship, is an item of bother and labor, which many times can be lightened. We have a scale of sizes for crates. When we build we make a side; then lay another side on top and build all the sides first. Then make all the bottoms, then the tops. If crowded for room, one can build twenty crates in this way and leave them knocked down and put them together when needed. When in this form a crate can be put together in five minutes. Always have a few of each size on hand for immediate use when they are wanted. It is good rainy-day work. The average crate is made too low for comfort; a crate should be high enough to allow a hog to sit on his hind quarters and stand in front, which raises his head some higher than when he stands on all four quarters. Here is a table of measurements for different-sized crates which will answer the purpose in shipping different sized pigs or hogs:

Length	Height	Width
3'	28"	14"
3' 6"	30"	18"
4'	30"	20"
4' 6"	32"	22"
5'	34"	22"
6'	36"	24"

Bottoms are made by using strips one inch thick and one and one-half inches wide. Lay them down the length of the crate and build the floor on them crossways. The sides are fastened by nailing to the under strip, which is flush with the floor. All standards are on the outside of crate to prevent the strips being pushed off if the animal presses against the side of the

crate. Tops are made lengthwise with cross piece at front, middle, and one inch from back, so tail boards can be put in up and down; these are less liable to rub tail than when a hog is nailed in with strips across the crate as in front. Crates four and one-half feet long, and longer, should have center standards to strengthen the crate. Bred sows should have good roomy crates, especially in width.

Kinds of Timber Used.—I believe that linden—sometimes called basswood—makes even a better crate than elm or poplar, but this is also hard to be found and as high in price as clear cork pine, so that one is almost compelled to use such material as can be found in his own vicinity. We have used a little half-inch beechwood for the sides of crates for light pigs, which is fairly satisfactory but inclined to split when driving nails in it, unless previously softened by placing the ends in water. We once bought a dozen or so of the nicest shipping crates that it is possible to imagine, made of electric welded woven wire sides, end and top, so hinged and locked together that they made an ideal crate which could be quickly knocked down and returned in a collapsed form to the shipper. A plainly printed, substantial tag was fastened on each crate giving directions to the receiver of the animal to please knock down and return. This was usually done, but occasionally a man receiving it would either forget to return the crate or imagine that it belonged to him, and in this way the original number purchased by us, after a year or two, were all lost by not being returned. We decided, however, to try them again and ordered a new lot, only to find that the party making them had gone out of business and he replied that he was unable to make any more. If his patent could be secured by some enterprising company and the crates made in large numbers, I think they would prove very profitable to the manufacturer, as they are the most satisfactory shipping crates that can be conceived of for hogs of all ages.

There should be a manufacturing company somewhere that would get together all these conveniences for the equipment of swine breeding farms.

Preparing a Pig for Shipment.—Some men think that when a pig is to be shipped some distance he must be stuffed with an unusually large feed the morning he is to leave. This is a mistake. We had rather the pig would not be fed the morning he is to be shipped, as he will ship better and arrive at destination in better condition without his morning feed, unless it is a distance that will require more than two days. This may seem strange to a beginner but an old breeder generally prefers to ship his pigs on an empty stomach. Particularly is this true when pigs are shipped during the hot months, as they will ship cooler by simply having what water they will drink and no feed.

It is well to brush the pig and make him thoroughly clean before he is crated; then he should be sprayed with a disinfectant

giving him a nice clean finish. A little dry clean bedding of some kind should be placed in the crate. If the pig is going a distance that will require four or five days to make the trip, then it is best to put a little feed in a small sack and tie it to the crate with instructions to feed a very little once daily. A five-cent tin basin wired in one corner of the crate on the floor will serve as a place to water and give a little feed if it is necessary. A notice should be placed on the crate, if it is during the summer months—"See that the crate is kept near an open door in the car, facing the way the train is going, that the pig may get the benefit of the breeze." Should the pig become over-heated it should have attention at once, and instructions should be given the route agent to sprinkle the pig's nose with a little water and put some water on the floor of his crate so as to wet the pig underneath, but under no consideration should cold water be thrown on the body of the pig when over-heated, as it means almost certain death.

The Pig on Arrival.—On receiving a pig that has been shipped a long distance, do not expect to see him come out the crate looking as if he were just from a handbox, for naturally he will be gaunt, somewhat dirty and probably quite tired. Brush him off nicely, put him in a place by himself and give him a drink of fresh water, after which give him a light feed, only a little at first, until he is rested, or until the next feeding time comes, when you may give him a little more feed than at the first time; thus you will gradually bring him up to his full feed.

Notice, on receiving the pig, if he seems constipated; if so give him 2 tablespoonfuls of Epsom salts in his feed and let him take a little exercise where there is some grass.

It is a good thing when ordering a pig from a breeder, to ask how the pig has been fed, and if you can do so, continue about the same ration he has been getting. If you wish to change to a different system of feeding, do so very gradually and you will not be disappointed. If you should overfeed the pig on the start, everything will go wrong, and you will be much disappointed later.

CHAPTER XXIII

WHAT A BREEDER OF FULL BREDS SHOULD BE

Probably there is no business that requires character and intelligence in a man, to a greater degree, than the breeding of pure-bred stock of any kind. First, the young man when starting should know that he likes the business, and has made up his mind to follow it as a permanent business and to stick to it through thick and thin. This matter of stick-to-it-ive-ness is one of the principle elements a man should have. Next, he should be a man whose character is above reproach and absolutely honest. With these elements and a determination to succeed, he can build up a life business that is gratifying in every way.

Then, he must select as good animals as possible to found his herd; he must cull a goodly proportion from the produce each year to sell as pork hogs, selling nothing but the better animals for breeding purposes. He must keep careful records of his breeding; he must be prompt in answering inquiries; he must be truthful and reliable in every way, so that the purchaser may know when he receives the pedigree of a pure-bred animal that it is absolutely correct. Much, in fact, depends on the correctness of the pedigree, and that is dependent on the man who writes it, for this reason he must be dependable in every respect. A man who is not dependable cannot build up a permanent business.

The policy of the pure-bred stock breeder should be always to satisfy his customer, if possible.

CHAPTER XXIV

PEDIGREES

This is a matter that does not greatly interest the farmer or feeder who is growing hogs simply for the open market, but must be understood, and thoroughly so, by the breeder of registered hogs who expects to sell a large portion of his produce to other breeders. A pedigree amounts to nothing unless it is a *correct record* of the different blood lines in the sire and dam taken from the established records for the breed. The pedigree in itself adds no value to the individuality of the animal but it is a means of noting the various blood lines that has produced the animal. Neither is a pedigree of any value unless it is made by a man who would under no circumstance write in other than the correct names of animals, with their herd book numbers. A man who would make a false pedigree would do anything else false that came to his mind and should not last long as a breeder of pure-bred hogs of any breed. In other words the pedigree should be a *guarantee* that only such animals were used in producing the particular individual as really were used.

Study Blood Lines.—One who is well versed in the principles of breeding pure-bred animals, and familiar with the value of the different blood lines of the breed, can by studying the pedigree of the animal he purchases to head his herd, know practically what the results will be from using him. The more animals that appear in the pedigree that have made good as producers of superior stock, the better the pedigree and the more valuable it becomes as a guarantee for future quality in the herd; hence it is of great importance that the owner of a high class breeding herd, who wishes to continually improve the quality of his herd, study carefully the pedigree of any new animal that he wishes to introduce as the head of his herd. It is a well known fact, however, that there are few outstanding sires that are worthy of special note in any breed of pure-bred hogs, and buyers of boars, when they order a boar for use, should not expect him to be "one in a thousand," unless he has investigated the animal's get and has proof of the fact that he is "*one* in a thousand," and if such a boar is found he, the buyer, must expect to pay a very large price to secure him, for the owner can ill afford to part with this kind.

Correspondence.—The breeder of pure-bred hogs, after he is established, will have a large amount of daily correspondence to look after. He should make a rule to be prompt in his replies, answering all questions carefully, describing the animal he offers so that the man will not be disappointed, should be order. He should keep a carbon copy of each letter written. He should always keep a letter file of some kind, whereby he can keep each man's

correspondence by itself. I think we have every letter received in thirty years, and pasted to it is a carbon copy of the reply. A card system should be kept with the name of each and every correspondent you do business with, and a follow-up card system would be well, as a follow-up letter often results in getting an order that would be overlooked otherwise.

Every breeder should procure a typewriter and learn to use it, and write all letters on this machine. It is rather hard for some men to write a nice hand with a pen, and there are often some words in the letter that are not plainly written and that puzzle the one receiving it; besides, when writing a letter on the machine the copy can be made at the same time and filed with the original letter.

System.—System is a great thing, even in the hog business. Systematic methods of keeping all records, filing all letters, keeping the cards, the breeding records, the feeding records, and everything connected with the business, is most important.



CHAPTER XXV

ADVERTISING

This chapter is written for the benefit of breeders who are selling pedigreed stock for breeding purposes, and I want them to consider the matter of advertising *one* of the most important parts of the business. *First* is the breeding of the right kind of hogs to furnish breeders. The next thing is the proper care of them until they are ready to ship to the breeders. Then comes advertising, which is as important as anything else, for without advertising of some kind there will be little or no business.

I have mentioned in a previous chapter, that the matter of attending the county fair circuits and showing was one way to commence a good line of advertising, and after a little experience at county fairs, to take a step a little further up, and show at the state fairs and large expositions, or in other words increase the show ring practice as you increase your knowledge of the business, and ability to bring out the right qualities in animals. This show ring experience and mingling with hundreds of farmers and others, is a good way to start a permanent acquaintance, and establish the business, and the orders taken while at the county shows should be almost enough to dispose of the surplus for the first year or two, and when later the larger shows are made the sales should increase accordingly.

The young breeder should at these shows keep a list of the names of all men with whom he becomes acquainted and who are interested in his breed, as well as a list of the men to whom he sold pigs.

Persistence in Journals.—Besides the advertising made at the shows, the breeder should be a liberal advertiser, not only with his breed organ but with other leading reliable publications that go to the homes of the better farmers and breeders. While speaking along the lines of advertising I wish to impress upon the mind of the breeder the necessity of his advertisements being permanent or continuous, not spasmodic. What is more assuring to a prospective purchaser than when looking through his various swine and live stock publications to find the name of some advertiser of his favorite breed, whose advertisement always appears in each weekly or monthly issue of his paper? This goes to show that the one who advertises this way is a permanent and constructive breeder, but if you find the advertisement of a breeder of your breed, who comes out with considerable gush once or twice in some publication and then drops out, you are not inclined to send such an advertiser an order, and you may conclude that as he had dropped out his advertising, he may also have dropped out of the business. These are

matters that I know from absolute experience in many, many years of continuous advertising. We have never carried but one or two advertisements at one time, but for over thirty years our advertisements has never failed to appear continuously. While possibly not needing this advertising some times to help dispose of our stock, we believe that as there are many new men entering the arena as breeders, as well as farmers and feeders, it is the profitable thing for us to keep permanently and continuously before the people, and so we continue to advertise even after many, many years.

We often receive letters from parties, who say: "I have seen your ad. for many years, etc.," which shows they understand we have been in business a long time, from the fact that we are continuously appearing before the readers of good publications.

Herd Catalogs.—Another good advertising plan is occasionally mailing out either a herd catalog or a neat folder, giving a little history of the herd and the business done, also listing the names and numbers of the brood sows and herd boars, and a list of the litters farrowed that season. Some breeders also believe in publishing once or twice a year, a circular describing certain animals and their breeding, which they are offering for sale at that time. This is a good plan.

Another matter that is quite important is the necessity of using a typewriter, and learning to use it properly, and never to fail to answer correspondence promptly and in an intelligent manner. It is not necessary to use all the adjectives that one can scrape together in describing what he has to offer the inquirer; better be a little modest along this line, simply stating the breeding and a *true description* of what you have to sell, with the price.

Stationery.—The style and quality of stationery one uses is also one of the things that makes an impression on the inquirer. A neat, plain letterhead, with as little printing on it as possible, and paper of a good quality, speaks well for the breeder and impresses his correspondent with the belief that this man is not making any extra flourishes. A good judge of human nature can quite readily determine something as to the character of a man by his stationery, and still more by the letter he writes. We have never found it necessary in our business to cover very much paper in replying to a letter. However, we often receive letters that contain quite a number of pages, which after reading and trying to digest, it is hard to really know just what the man wants, further than that he seems to want an animal that will score upwards to 100 points, and then wants it for an extremely low price, with all the guarantees he can think of, added.

There is another matter that is quite important in the way of advertising; always have your home grounds, hog quarters and other parts of the equipment of the hog establishment, as well as

the hogs themselves, in shipshape for visitors. Do not feel obliged when a man suddenly appears on your farm to inspect your herd, to commence apologizing for the condition of things in general. Always have them so that a good impression may be made on the mind of a visitor, for he is taking all things in as he passes down the line, and you certainly wish to make a good and not a bad impression.

First impressions are lasting and these should be as favorable as one can offer.

When writing advertisements one should try and be as concise as possible, and not say too much, but say it in a way that will attract the attention of the reader. The writing of advertisements is an art.



CHAPTER XXVI

HOME-CURED PORK

I have often wondered why more farmers who grow pork for the market, do not take up the business of a farm packing plant on a small scale. I am sure pigs and hogs of different weights could be slaughtered on the farm; the products cured in the good old home way, and sold to local stores or markets for better prices and better profits than could be received for live weight. I feel certain that a farmer who would prepare for this work could profitably market a high class article of all pork sausage—something that cannot be found in a butcher shop. He should take great pains to make this as perfect as possible, just as he would make it for his own family. Put it up in attractive packages of one, two or five pounds each, and furnish one or more of the best groceries in the nearby city. Or the farmer could send out small sample packages to the better class of citizens in the city and he soon would build up a retail trade that would astonish him, and at prices much above anything sold by the butchers.

Further than this, the hams could be home-cured in a sweet pickle or mild cure and smoked as they should be, slightly, rather than be cured "while you wait" with chemicals, and smoked with creosote dressing. There is no more delicate morsel than a farm-cured ham from a young pig of about 200 pounds. There is a great demand for such hams during the winter season, without any smoking whatever. I personally like this kind of curing better than when smoked, but hams cured in this manner would not keep during the long summer months. The older hog, with the exception of the spare ribs, should be made into sausage. There would be little fat pork in light young hogs, but older ones could be finished for this purpose from which extra fine fat pork could be furnished, as well as a very choice quality of home made lard. Pickled pigs' feet, head-cheese and souse could be easily introduced to the fancy trade.

The main thing is in *starting* this business and going at it with the determination to build up a business. I believe a farmer could hardly raise enough hogs and pigs in a year to supply the demand for the fancy pork products that he could put up, as the consumption of pork products is constantly increasing from year to year. We must remember that every morning there are over three thousand new mouths to feed in America, and practically every one of them to eat the product of the American hog and enjoy it. Meat production increases wealth, and the grain products of the farm can all be utilized in the production of high-class pork. We have no animal of greater economic value than the pig; he matures quickly and brings ready returns. If there was no money in pork

the farmers of the west would not grow eighty-five million dollars worth each year, to supply foreign nations, besides keeping enough at home to supply the demand of our own people.

Boneless Pigs' Feet.—Cut the feet off with a sharp knife and a little saw, well above the ankle joint; wash in hot water and scrape thoroughly and clean. Lay them in salt water over night to remove all blood. Put on to cook with enough slightly salted cold water to cover, and cook from three to five hours, until the bones loosen. Place the meat in a chopping bowl and chop medium fine. Strain the liquor in the pot in which the feet were boiled and season it with vinegar and pepper to taste. Then add the meat and cover with this juice to which should be added more hot water, as it will bear diluting. When cold turn out of the bowl and cut down in slices half an inch thick.

Pigs' Feet Souse.—Cut off the horny part of the feet and toes; scrape clean and wash thoroughly; singe off any stray hairs. Place in a kettle with plenty of water, boil and skin. Pour off the water and add fresh, and boil again until the bones will pull out easily, but do not pull them out. Pack in a stone jar with pepper and salt sprinkled between each layer; cover with good cider vinegar. When wanted for the table take out in sufficient quantity and put in a hot skillet; add more vinegar, salt and pepper if needed; boil until thoroughly heated; stir in a smooth thickening of flour and water, and boil until the flour is cooked. Serve hot for a nice breakfast dish.

Head Cheese.—Having thoroughly cleaned the pig or hog head, split it in two; take out the eyes and the brains; thoroughly clean the ears; throw scalding water over the head and ears and then scrape absolutely clean. When perfectly clean put in a kettle, with water to cover, and set over a quick fire, skimming as any scum arises. When boiled so the flesh leaves the bone, take the head from the water with a skimmer, and place in a large wooden bowl or tray; then take out every particle of bone, chop the meat fine, season to taste with salt and pepper—a little powdered sage may be added—spread a cloth over the colander, put the meat in, fold the cloth closely over it, lay weight on it so that it will press every part of the surface equally. When cold take the weight off; remove from the colander and place in a crock. Some add vinegar in the proportion of one pint to each gallon crock.

Fried Salt Pork.—Cut in rather thin slices, freshen by letting stand an hour or two in cold water or milk and water. Roll in flour and fry until crisp. Drain off most of the grease from frying pan. Stir in, while hot, one or two tablespoons of flour, half a pint new milk, a little pepper and salt, if necessary. Let boil and pour into gravy dish. This makes a nice white gravy when properly made.

Baked Ham.—Most persons boil ham. It is much better baked, if baked right. Soak the whole ham for an hour in clear water and wipe it dry. Next spread it all over with thin batter, and put into a deep dish with sticks under it to keep it up out of the gravy. When it is fully done take off the skin and batter crusted upon the flesh side and set away to cool. It should bake from six to eight hours. After removing the skin, sprinkle over the ham two tablespoons of sugar, some black pepper and rolled crackers. Put in a pan and return to oven to brown. Then stick cloves to the fat portion and dust with powdered cinnamon.

Boiled Ham.—Pour boiling water over the ham, and let it stand until cool enough to wash. Scrape clean; put in a thoroughly cleansed boiler with enough cold water to cover it; bring this to the boiling point and then place on the back of the stove and let simmer steadily for from six to seven hours or until very tender when pierced with a fork—be careful to keep the water at boiling point but do not allow to go much above. Turn the ham once or twice while in the water. When done put in baking dish to skin. Dip the hands in cold water and take the skin between the fingers and peel it as you would an orange. Set in a moderate oven placing the lean part of the ham downward. Sift over it rolled crackers and bake one hour. Or cover with the white of a raw egg and sprinkle sugar and finely pulverized bread crumbs over it. Place in the oven and brown. The baking brings out a quantity of fat leaving the meat much more delicate; in warm weather it will keep in a dry, cool place for a long time.

Boneless Boiled Ham.—Soak a well cured ham in tepid water over night, boil it until perfectly tender, putting it on in warm water. Take up in a wooden tray and let cool. Remove the bone carefully, press the ham again into shape and return to the boiling liquor. Remove pot from fire and let ham remain until cold. Cut cross wise and serve cold.

Delicious Fried Ham With Eggs.—Slice ham and place in boiling water and cook until tender. Put in frying pan and brown; then place on platter. Fry some eggs by dipping gravy over them until done instead of turning them. Take up carefully and lay on slices of ham.

Ham and Egg Lunch Loaf.—Chop remnants of cold boiled ham; add crushed crackers and from three to six eggs, according to the amount of meat. Bake in a round baking powder can and when cold it may be sliced for the table.

Ham Balls.—Take half a cup of bread crumbs and mix with two eggs well beaten. Chop fine some bits of cold boiled ham and mix all together. Make into balls and fry.

To Cook Pickled Side Meat.—Cut in slices to fry; parboil to freshen. Roll in flour and fry until cooked through.

Home-Made Sausage.—It is the writer's job to make the Berkshire sausage at Lovejoy Farm and in doing this I take much of the choice meat that might be used for other purposes, often using the entire shoulder of the hog as well as all trimmings from the ham, sides, etc., using about equal proportions of the fat meat and lean, although sometimes making sausage largely all lean meat, yet I do not think this gives as good or as tender, well flavored sausage as where the fat and lean are of about equal proportions. We often use the tenderloin strips also in the sausage meat yet this is almost too delicious a dish, when fried by itself, to be given up by placing it in the sausage. After all meat is prepared for sausage it is run through a grinding chopper and made very fine. We also pulverize sage through this same meat grinder, then flavor the meat with salt, pepper and sage to taste. During cold weather it is kept in large crocks and cooked as needed. Where large quantities are made to be kept through the summer, it is cooked and placed in muslin sacks of about twelve inches in length and three or four inches in diameter, which are then dipped in hot lard until the cloth is well filled with the lard, then taken out and placed in a cool, dark cellar to be used as desired.

Curing Thick White Fat Pork.—Where one wishes to put up the very thick fat pork for home use, he may cure this by what is known as dry salting. Take a large earthen jar, large enough to hold all one wishes to pack, put a layer of salt in the bottom of the jar, then pack the square cut pieces of pork snugly together and fill all spaces with salt, and a light covering over the top, then another layer of fat meat as before and continue this until all is packed and thickly covered over the top with salt. Set this in a cool place where rats or mice cannot get to it, and let it remain, using from it whenever the real fat pork is needed.

Home-Made Lard.—It is best for the farmer to make his own lard when possible for the simple reason that it is cheaper than to sell his hogs on the market and then purchase lard; besides, when the housewife makes lard for home use she knows what she is using. Lard is almost a pure oil of a permanent composition, and moisture and air have little affect on it. Care should be taken to see that the lard is pure, such as the leaf lard, especially if it is to be kept for any length of time. Stone jars are the best vessels to keep the lard in after being rendered, and should always be kept in a cool, dry place.

Besides the lard made from the leaf lard, there is much more of the animal fat that can be used for this purpose. All the trimmings of fat from the hams or shoulders, and all the gut fat may be rendered into a good quality of lard. Many persons who do not care for the fat pork, or at least as much of it as is furnished from the fat hog carcass, can use all that is not needed for fat pork for the manufacture of lard.

A Recipe for Curing Hams.—Many years ago, at a show in New York State, a farmer won a \$100 prize for the best home-

cured ham. I have used his recipe ever since, and with great satisfaction.

To 100 pounds of meat use—

8 pounds of clean pulverized rock salt,
3 pounds of brown sugar,
2 ounces of pulverized saltpetre,
2 ounces of bicarbonate of soda (cooking soda),
4 ounces of red pepper.

After the hams are thoroughly cooled, rub in the above mixture well and place them in a tub or box and let them remain in this container for one week.

Make a brine of the above mixture, which should be boiled and strained through a cloth, and left till cold. Then after brushing the dry mixture from the hams, place them in a tub or large earthen jar or any receptacle that is big enough to hold them, and pour brine over them, so that they will be entirely covered. Place a floating cover over the hams, and on this cover a heavy weight so as to hold the hams under the brine, and leave them for one week, after which they can be taken out and smoked, if desired. Should you not wish to smoke these hams, they can be left in this brine and used as needed, until hot weather.

The bacon and shoulders, back meat and fat meat can all be cured in like manner.

This method of curing produces a very delicate and choice product and would be termed a "mild cure" for hams and bacons.

The manner of smoking can be done as preferred, but we use many of our hams without smoking at all, if used before hot weather comes on.

Such portions of ham and shoulders as are not to be smoked may be left in the brine as mentioned heretofore until such time as insects might appear. If one wants to keep the smoked hams for any length of time they should be securely covered with canvas and either white washed or packed in bran or oats. The room where cured meats are kept should be as cool and as dark as possible.

CHAPTER XXVII

HOG CHOLERA AND SERUM

During the last few years we have made it a practice to keep the entire herd immune by the simultaneous treatment. In the summer of 1913 we immunized 219 pigs at one time, using the simultaneous treatment, and the loss was about two per cent. This leads me to believe that our government authorities and others who have been instrumental in working out the simultaneous serum treatment, have in it the long-sought-for specific treatment for the prevention of hog cholera.

I am convinced, however that many have not fully understood this method of hog cholera treatment, and as I had been much attracted to and pleased with an article by J. L. Thatcher, I requested Mr. Thatcher to furnish a serum article for this book, and take great pleasure in giving him full credit for the excellent service he has rendered swine breeders by his contribution to hog cholera literature. Mr. Thatcher's article which follows, is commended to the thoughtful attention of every reader of this book, with the hope that the serum treatment will be better understood and more generally followed. I firmly believe that if his suggestions were properly carried out in time we could stamp out this dread disease:

In accepting the invitation of the author of this book to write on hog cholera and its prevention by the serum-simultaneous method of treatment, I did so with the idea that I could talk as one breeder to another, and with the hope that what may be said may lead to a more active and persistent campaign against a disease that, judging by the results attained at Iowana Farms, and elsewhere where the treatment has been given a fair and intelligent trial, can be prevented and ultimately wiped out.

Apart from the purely elementary scientific statements that are made in order to give a clearer understanding of the nature of hog cholera as a disease, of what is meant by immunity, and of the process followed in obtaining serum, the statements made and the conclusions drawn are based entirely upon our work with registered swine. They show what we have accomplished and the policy we have permanently adopted in preventing the disease. The results have been very gratifying to us, and have enabled us to prevent the enormous loss which almost inevitably follows when a hog cholera epidemic strikes a herd. If our experience, with the results attained and the conclusions drawn, can be of benefit to the swine breeders of the country, we are glad to make known what we have done, and to do our part towards stamping out a disease that is annually causing the loss of tens of millions of dollars throughout the United States.

The prevention of hog cholera, and through its prevention the control and ultimate eradication of the disease, is the most urgent and financially vital problem which confronts swine breeders and farmers throughout the entire country today.

Losses Due to Disease.—Now when we consider that fully 90 per cent. of the hogs that die from disease die from hog cholera, we can readily gain some idea of the magnitude of the losses we are annually sustaining through this disease alone, and of the imperative need for a nation-wide

campaign against this scourge in which not only breeders and farmers, but state and national authorities themselves shall join, fighting continuously and persistently with the end in view that in, say ten years, our entire country may be declared practically cholera free.

The financial losses sustained through the loss of pork hogs alone is, however, only one phase of the proposition.

The progressive, business farmer no longer follows the practice of looking for his annual profits through the sale of grain crops. Rather he looks for his gain through the raising and sale of live stock. He needs the manure to maintain the fertility of his soil, and he is appreciative of the fact that a bushel of corn that sells for fifty cents on the market, will bring him one dollar when disposed of in the form of pork.

Further this same farmer realizes, or is beginning to realize, the greater returns to be gained from the breeding and raising of pure-bred stock, and he is constantly endeavoring to improve his herds by the introduction of pure-bred, registered animals.

Yet it matters little how successful one may become as a breeder of improved hogs, or in the building up of his herd, as a feeder if he is to be at the mercy of hog cholera epidemics, and is constantly confronted by a condition that may in the space of a few days wipe out his entire herd, destroy utterly the results of years of work and study in selective breeding, and with it all inflict upon him a loss that in many cases reaches into the thousands of dollars.

Concerted Action.—Even a casual consideration of the facts given above will show the absolute necessity of some definite, effective, concerted action which can and will stay the ravages of this disease and work to its final elimination. And particularly is this so when there is no longer any question that the trouble can be controlled.

Up until within the past few years hog cholera has been one of the stubborn diseases to respond to treatment. Although the whole pharmacopeia has been searched for a specific cure, no such cure has ever been discovered. Many so-called remedies have been boasted and boosted, but not one of them has ever proved efficacious when an emergency arose. Even proper feeding, proper housing and sanitary surroundings, though essential in maintaining animals in a healthy condition and rendering them more able to fight disease, have not proved a safeguard against cholera infection. And on the contrary, it might be added, that there is no condition or set of conditions, even improper care and feeding of hogs, that will bring on cholera infection without the presence of the living cholera germ.

A Contagious Disease.—Hog cholera is characteristically a contagious disease and is caused by a living germ that develops and multiplies in the body of the animal and produces a poison fatal to life. Even though scientists have thus far, because of inadequate equipment, been unable to identify the particular bug that causes the havoc, the proof of its existence lies in the fact that if a few drops of blood from a cholera infected hog be injected into the system of one not so infected, the blood of the latter animal will become as thoroughly impregnated with cholera virus as was that of the former. This condition, however, would not and could not obtain if the blood of the original animal did not contain a living, active organism. An inactive or dead foreign substance injected into the blood of the second hog could not multiply or increase in quantity.

The discovery in this instance, as in the cases of all contagious or infectious diseases, of the origin or cause of the disease marked the first steps toward the prevention and control of hog cholera, and thanks to the investigations and activities of our Department of Agriculture and our Experimental Stations, we have, I am firmly convinced, an absolute method of preventing the disease and of bringing about its complete eradication. In my mind it is no longer a question of *how* to prevent hog cholera, but rather is it one of how to provide the proper means under efficient supervision and regulation, and then to get the farmers to use them.

It may have been noticed that no claim has been made that a *cure* for this disease has been discovered. Our hope for its control lies in its prevention rather than in its cure, and this brings us to the discussion of the serum method of treatment, which is distinctly preventive rather than curative in its nature. Success in fighting hog cholera lies in warding it off rather than in overcoming it after the animals have become diseased.

Method of Procedure.—To understand this method of procedure it is essential that one has in mind a clear idea of what is meant by immunity.

It is common knowledge that when a person has once recovered from an attack of certain contagious diseases he is thereafter less liable to respond to a second attack of those same diseases, and this holds with other animals as well as with human beings. Such individuals, whether persons or other animals, are said to be immune to those particular infections.

What this immunity consists in is still under debate, I believe, but whatever its nature it is very clear that those animals possess a resisting power they did not possess previous to the first attack of the disease.

Scientists tell us that all disease-producing germs or bacteria develop certain toxins or poisons which acting upon the body cells and nerve centers tend to cause death. At the same time that this invasion is going on nature, in her attempt to save life, begins the manufacture of a counter-acting substance, called anti-toxin, the function of which is the destruction of the living, death-producing microbes and thus stay or limit the progress of the disease. There is, therefore, being carried on within the system of the infected animal a life and death struggle between these two opposing forces, the toxin and the anti-toxin, and the ultimate success of the one or the other means either the death or the recovery of the hog. In the large majority of cases, however, the body becomes so thorough impregnated with the poisonous germs that the anti-toxin cannot be developed rapidly enough and hence the animal dies. If, on the other hand, the animal has at the beginning an unusual or sufficient amount of native resisting power, or the infection be not of the more virulent nature, recovery takes place and thereafter the animal is considered, and is in reality, immune.

It is from the blood of these immune hogs that the serum is secured, which, when injected into the systems of other hogs, renders them likewise immune to the attacks of hog cholera.

Ordinarily, however, the blood of these merely immune hogs contains only enough anti-toxin to protect the animals themselves against the disease, and thus the serum from the blood of such animals, in small doses, would not be effective in immunizing other animals. This necessitates the production of what is known as a state of hyper-immunization in the hogs from which the serum is to be taken. Hyper-immunization is produced by giving to an already immune hog large doses of cholera virus, thus causing the blood of the animal to become so saturated with anti-toxin that small doses of serum from his blood may be successfully used in immunizing other hogs.

Preparing Serum.—The method of preparing the serum may be briefly stated as follows:

Either a hog is procured that has recovered from an attack of hog cholera, or more frequently, such an immune hog is artificially produced by injecting him with a small dose of virus obtained from an acute case of the disease, while at the same time he is injected with a protective dose of serum. Thus an immunity is established. Then one of two methods may be employed. Either several successively increasing doses of virus may be given at intervals of about a week apart, or one extraordinarily large dose may be given at one time. Either of these methods is effective, but that of giving the one large dose has the advantage in the point of time saved. From a week to ten days after the last injection of virus the animal is bled from the tail, about a pint of blood being drawn from a hog weighing one hundred pounds. The blood so drawn is allowed to clot and the clot is then strained under pressure, and the resulting serum

is given sufficient of a five per cent solution of carbolic acid so that ultimately it contains one-half of one per cent of carbolic acid, this being for the purpose of increasing its keeping qualities.

This bleeding process is repeated at least twice at intervals a week apart, the whole being then mixed to give a uniformity of product. It should then be tested by practical experiment to determine its potency before being sent out and is then ready for use. If properly prepared, the serum is undoubtedly effective in immunizing against cholera when used in doses of 20 to 25 CC for hogs weighing 100 pounds, with doses of 15 CC extra for each successive 100 pounds of live weight of hog.

In warding off or preventing cholera by use of serum one of two methods may be employed. First, by the injection of serum alone under the skin or into the muscles of the animal. This is known as the simple serum method and gives only temporary immunity, say for about thirty days. The second method, known as the simultaneous method, consists in the injection of the same amount of serum, but at the same time a small amount of cholera virus, from 1 to 2 CC, according to the age and size of the animal, is also injected into the animal being treated. The second method produces what is known as active immunity, and is permanent in its character, lasting during the period of the animal's life.

Which ever method is employed certain essentials must be absolutely insisted upon if any degree of success is to follow the work; and particularly in the simultaneous method must this be so if disastrous results are to be avoided.

Essentials.—*First, the serum and virus used must be pure and potent; and second, the person treating the hogs must know his business thoroughly—that is, he must be able to know hog cholera when he sees it, he must know which method to employ under the given or existing conditions, and he must understand how to do the work. Failure in the observation of these requirements will explain why there are still so many breeders and farmers who doubt or question the efficacy of the serum treatment and hesitate in its use.*

To secure the proper kind of serum and virus it is necessary that all serum and virus should be tested to determine their potency before they are sent out for use, and this by expert supervision under state or federal control. Ample means and equipment for their manufacture should be provided so that when emergencies arise and the demand for serum and virus becomes large and urgent the calls could be met and the product sent out would be pure and potent. This comes within the business of the state. To be sure there are numerous commercial plants manufacturing serum and virus, but these likewise should be brought under state or national supervision to insure the excellence of their product.

That the work of treating hogs should be done by one thoroughly acquainted with the disease and competent to give the treatment should go without saying, when one considers the importance of the undertaking and the magnitude of the losses that may result if failure follows.

Which Method?—Which method of treatment should be used must be determined by existing conditions. Where an outbreak has already occurred and it is desired to treat the remaining apparently well animals the simple serum method should be employed, for it is very probable that many, if not all, of the animals so injected have become previously infected and the treatment will result in permanent or active immunity. The use of cholera virus on hogs that have already become infected or are otherwise diseased is simply adding to their troubles and will almost invariably result in the death of the animal. Further, the *simple serum method only should be used in treating brood sows in pregnancy*, even though the treatment may have to be repeated to carry them on through farrowing and until their pigs are old enough to wean, and then both sows and pigs should be given the simultaneous treatment.

The simultaneous method should always be used where permanent immunity is desired, and especially so whenever the animals are to be placed in lots or houses in which cholera outbreaks have previously occurred.

As to the efficacy of the simultaneous treatment, where the serum and virus are right and are properly given, to produce immunity and thus permanently prevent the ravages of hog cholera there is in my mind absolutely no question.

That it can be done has been proved time and time again. To be sure there are numerous cases where serum has been used with no apparent effect, and the simultaneous treatment has been given in order to gain permanent immunity, that results have been deadly and almost entire herds have been lost. But careful investigation, and thorough analysis of the serum used have proved, or would have proved, that where the simultaneous method was employed the simple serum treatment only should have been used, and in both cases the serum itself had lost part if not all its potency.

My Own Experience.—In May, 1911, with 172 head of hogs, young and old, on hand, cholera broke out in our herd. We immediately began the use of serum, injecting not only the hogs already sick with the disease, but also those that had been exposed. The effect of the treatment was to check the progress of the disease, and our losses were confined to those animals that had become badly infected before the serum was used. We came out of the siege with 127 animals, having lost forty-five—eight mature hogs and thirty-seven pigs. Compare these results with those of one of our neighbors whose herd was attacked by cholera shortly after our herd became infected. He had 165 animals, young and old, at the beginning, and he came out of his trouble with only five head remaining—two sows and three pigs. He did not believe in the serum treatment or in its virtue as a preventive. Note the comparative results and draw your own conclusions.

This outbreak of cholera in our own herd led us to adopt the policy of permanently immunizing every animal. Those that had recovered from the disease were already immune. Those that had never shown sickness, even though they had previously been given the simple serum, were subjected to the simultaneous treatment. This practice we rigidly adhere to. All young pigs from immune parents, before being weaned, and all new stock brought into the herd, unless we are positive it has already been treated, are likewise given the simultaneous treatment. And in giving the treatment we have never lost a single animal as a result of such treatment, and up to the present time we have treated upwards of 1,300 animals. In this, however, we have been singularly fortunate. Statistics show that ordinarily a loss of from two to five per cent of the animals treated may be looked for. But even this is insignificant when compared with losses that commonly follow an outbreak where the treatment is not employed.

Applying the Treatment.—Our method of procedure in giving the simultaneous treatment may explain in part the reason for our freedom from loss following its application.

In beginning the work of immunizing our herd we gave each animal a *regular dose of simple serum alone*. This was given as a preparatory treatment. Fourteen (14) days later we gave each animal thus treated the double or simultaneous treatment, using the *virus and the regular amount of serum*. The preparatory treatment paved the way for the simultaneous treatment 14 days later, and rendered the animal better able to stand the latter treatment.

In treating pigs *whose parents are immune*, we give the simultaneous treatment at once, and without the preparatory dose. We usually treat our pigs about two weeks before we wean them.

Hogs and pigs being treated should be given a clean, dry place to house in, plenty of cool, clean water, and all heating and heavy feeds should be discontinued for a couple of weeks.

In case any animal, given the simultaneous treatment, is not doing well as a result of the treatment, give it another, a double dose of simple serum. This will help carry it through the fight.

While we recognize that the giving of the above so-called preparatory dose of simple serum doubles the cost of immunizing hogs and pigs, yet

the total absence from loss of animals by such practice fully justifies, in our minds, the added expense thus incurred. And especially is this true where the treatment is being given to pure-bred, registered stock.

Our observations in treating breeding stock have led us to adopt the following practice: We never give the simultaneous treatment to bred sows, nor do we breed sows within two or three weeks after treating them. Further, boars just treated should not be put into immediate service. Time should be allowed for the immediate after effects of the treatment to wear off the animals to regain their normal and active condition.

Results of Treatment.—The results of our experience in following out this practice have removed from our minds all fear of cholera epidemics. We do not hesitate to move animals from one house or lot to another even though we know that the latter may have contained hogs that had had cholera and are known to be thoroughly infected with cholera germs. And we have never had an animal become infected by such handling. Further, we do not fear to introduce new hogs into our herd regardless of where they may come from. During the entire show seasons of 1912 and 1913 none of our hogs were troubled with the disease, and after the fairs were over we did not hesitate to return our show animals immediately back into the lots with our other hogs.

Further Tests.—We have carried our tests still farther to prove the efficacy of the simultaneous treatment in producing permanent or active immunity. This was done to demonstrate to the breeders and farmers of this locality how cholera epidemics could be prevented.

In August, 1912, one of our young barrows was placed in a herd of hogs in which an outbreak of cholera had occurred. He remained there fifty-five days without contracting the disease and then was brought back and placed again among our own hogs.

The second of January, 1913, we sent out three other barrows to be put among hogs that were dying from cholera. These three barrows remained among those sick hogs for more than six weeks, eating and sleeping with them, but not one of the three became infected or showed any ill effects from the rigid test under which they had been placed.

Further, at the International Live Stock Exposition in Chicago in 1912 the writer purchased six choice gilts to be shipped us and placed in our breeding herd. Knowing the infected condition of the Union Stock Yards, it was stipulated that those gilts be given the simultaneous treatment before shipment. Through oversight on the part of the man left in charge of the animals they were not given the treatment, and were shipped immediately after the close of the Exposition and were placed at once among the other animals of our herd which numbered at that time something over 240 hogs and pigs. Only a very few days elapsed after their arrival before those gilts showed distinct evidences of cholera infection. Three of the animals had become so badly infected that it was impossible to save them. The others we were fortunate in pulling through by a liberal injection of serum. The important point in connection with this incident is this: Though all of those six gilts had the cholera, and three of them died from the disease, yet not one of the 240 immune animals *among which they were placed, and with which they had been eating and sleeping, became infected, or have we seen any evidence or trace of cholera among our animals since, and this was over a year ago.*

Such tests as these are our warrant for the conclusions we have reached that hog cholera can be prevented, and by its prevention be completely eradicated. And the results we have attained are being repeated by numerous other breeders who have adopted the system of simultaneously treating their animals and have given the method fair and intelligent handling.

Immunizing a Business Policy.—With us the permanent immunizing of our hogs is a business proposition pure and simple. The cost is strictly an investment in the way of the purchase of protection that will insure against losses that might reach into the thousands of dollars if we were not so protected.

An important point which should be mentioned is the possibility of carrying, or the transmission of, cholera infection from herds, in which the simultaneous method of treatment is employed, to herds which are not immune. For the past year and a half we have shipped hogs and pigs to every section of the United States, and we have as yet to learn of the first instance where any infection has been carried from our herd to other herds, even though those herds had not been given the simultaneous treatment. And further, we have as yet to hear of the first case where herds in our own locality have become infected because of our practice of employing the simultaneous treatment to immunize our animals.

It is advisable, however, that care should be taken where hogs are being shipped from herds in which the simultaneous method is used, and especially so when they are being sent into sections where the animals are not immune. Animals just treated should be held several weeks before shipment, and in all cases they should be thoroughly disinfected before being sent out. Upon being received by the purchaser they should be held in quarantine for about thirty days. Observation of the above precautions should remove all possibility of trouble.

Each Man Must Decide for Self.—Whether or not a breeder of hogs should adopt the policy of simultaneously treating his animals, and thus establishing and maintaining a permanent immune herd, is for each breeder himself to determine. Situated as we are, in the center of the great swine producing section of the country, where hog cholera outbreaks are constantly occurring, and hog cholera germs are with us practically all of the time, this method of treatment is our only salvation, and affords the only means by which we can check and prevent the disease. For breeders, who live in sections of the country where the disease seldom occurs, and who are not bringing in stock from cholera infested districts, the need for immediate action is not so imperative. But those breeders who do not adopt the practice of permanently immunizing their herds, and follow this up by likewise immunizing their young stock as it comes along each year, should be ever on the alert, and when an out-break of cholera does occur in their locality they should at once get in touch with their state authorities, and active and persistent steps be taken to check the progress of the disease.

Unfortunately, many of our states have not as yet provided ample facilities for the production of proper serum and virus to meet the demand when hog cholera becomes epidemic. Under these circumstances breeders are forced to depend upon commercial concerns for their supplies.

It is in helping the breeder to get pure and potent serum and virus that the state and federal authorities can be of greatest assistance. Every plant manufacturing these supplies should be under constant state or federal supervision, and every bottle of serum and virus sent out should bear the stamp of the government inspector. This would in effect place all serum and virus on a recognized standard basis as to their purity and potency, and would insure to the farmer and breeder the quality of the article they were getting. Then steps should be taken by the state authorities to see that the serum and virus are administered by men who know their business and have license to do the work.

While the simultaneous method of treatment affords a means of checking and eliminating hog cholera, in districts or sections of the country where it has become prevalent, every precaution should be taken to prevent its being carried into other sections or states not so infected.

A law should be passed making it a misdemeanor to sell a bunch of sick hogs. A law should be passed requiring the railroad companies to disinfect each stock car after it has taken a load of hogs to market, and every public stock yard should be thoroughly cleaned and disinfected at stated intervals. Further, a law is needed, and should be enacted by the federal government, requiring a certificate of health for a hog before he can be shipped from one state to another.

These are precautionary measures which are needed and which can and will do much towards preventing the spreading of the disease.

CHAPTER XXVIII

COMMON DISEASES

Worms.—The question of worms in pigs is one of greater importance than many breeders and farmers realize. The presence of worms in the stomach is not only a hindrance to thrift and growth, but if neglected, becomes a very dangerous matter, as the worms multiply very rapidly and are a constant drain on the vitality of the pig. Often they become so numerous in good sized shotes that they form almost a solid mass in the intestines, which results in emaciation of the pig and finally death. It is a question in my mind if more pigs do not die from stomach worms during the fall and winter months than from cholera.

It should be the practice of every farmer and also of every breeder of pure-bred hogs to feed something throughout the life of the pig as a preventive or a destroyer of worms. There are many medicated salts on the market, most of them good, and these preparations have proven, with us at least, successful in either preventing worms entirely or keeping the trouble down so much that we have never had any difficulty with worms. Even when feeding something of this kind, however, one will occasionally see the passing of worms from the pigs. Any worm powder that contains the proper amount of Santonin is good, and where the use of medicated salts is not quite sufficient, let the owner at once get a prescription from a veterinarian which will clean them out. Young hogs that are badly infected with stomach worms will have a very unthrifty appearance; the coat will be dry and "staring"; the head rather drooping as in cholera; the back arched; the pig coughing more or less, and becoming more emaciated every day, with little appetite.

Another species of worms that bother young hogs and pigs is what is known as thread worms, which form in bunches or large quantities in the throat and often about the lungs, causing a severe cough and much emaciation. These can usually be readily cleaned out by giving a couple of tablespoons of turpentine to each three hundred pounds of live weight, in the slop every day for three days, then skipping a day or two and using it again for three days.

It must be remembered that when you are doctoring a pig for worms with medicine of any kind, it should be given on an empty stomach, or in other words, after the pig has been kept from feed about eighteen hours, otherwise the turpentine or worm medicine would have little or no effect.

These species of worms are the only two with which I have ever had any experience during our many years of breeding pigs, and they never caused me any trouble whatever, as we are always on the alert for worm symptoms.

The eye of the feeder is one of the great things in the hog business. The man who feeds the pigs should take interest enough in his work to carefully note the condition of each animal daily, and if there is ever so small a change in the animal, by way of being a little "off feed," he must at once find out what the trouble is, whether it is an over feed from the day before, or a little indisposition from conditions which, unless promptly attended to, might lead to serious trouble. The old adage that a "Stitch in time saves nine" was never more true than in the care of swine.

Why Young Pigs Lose Their Tails.—One often notices when looking over a number of litters, especially of Spring pigs that were farrowed during the cold months of February and March, that a number of them have lost their tails. This condition is caused wholly by neglecting to provide dry beds for the sow and litter. I do not mean by this that an occasional change of bedding, once every week or two would prevent it, but that the bed of the young nursing litter must be absolutely dry at all times, and to make it such it should be changed at least every other day. Otherwise the bed will become damp and the mother and litter will heat it so that it soon commences to steam, and if you should put your hand on the straw you will find it hot and wet. This will surely cause their little tails to shrivel and in a week or so drop off.

If you notice a pig among your litter of youngsters that shows a little crease or crack around the tail within an inch or a half inch of the body, while the rest of the tail seems dry and dead, you may make up your mind that it will be a bobbed tail pig in a mighty short time. If the trouble has not gone too far, it may be overcome by cleaning the tail where the crack appears, with peroxide of hydrogen, which disinfects and purifies the sore parts, and if this is applied two or three times daily, and afterward the place rubbed with carbolated vaseline, if the case is not too bad, the tail may be saved. Of course the matter of bobbed tail pigs "cuts little ice" where the hogs are being raised for the pork market, but the loss of the tail greatly disfigures an otherwise outstanding show animal. While the average judge would not turn down an animal in the show ring for lack of a good tail and nice switch or brush, he would very much prefer that the disfigurement was not there.

Thumps in Young Pigs.—Thumps in very young pigs often occur where litters are farrowed in the colder months of the Spring or Winter. While there is no trouble in saving the litter if properly handled, there is danger of the young litter becoming too fat, particularly through the shoulders and front half of the body. This is caused by their not taking proper exercise, and receiving too great a flow of rich milk from the mother. In this case they always become extremely fat, especially about the heart and vital organs of the body, and so thicken up that it is almost impossible for the little fellows to breathe even while lying quietly in the nest, and when this stage becomes apparent it means almost sure death to the pigs if they are forced to take exercise; hence it is ex-

tremely important that if a litter is farrowed when it is cold and they are inclined to stay in the nest all day, they must be made to hustle out and take exercise enough to keep them from getting too fat.

This condition will be very quickly noticed by an observing man who looks after the sow and litter.

If the sow is a good milker there is all the more danger. In this case it would be well to feed the sow, for two or three weeks, on a ration that would not produce so much milk. This would be a great help in keeping down the trouble, but the pigs should be made to take plenty of exercise daily before any such condition appears.

There are several ways of compelling this exercise. One is to take the litter some distance from the sleeping place or nest and put them on the ground and let them work their way back. It makes no difference how far this distance is, if you are sure they will get back to the nest. If this custom is followed daily you will lose no pigs from so-called thumps.

Another plan is to take the pigs out of the nest and get after them with a broom and if they will not run away from you, force them to do so, by pushing them along.

Any system is all right that will compel lots of exercise.

Pleura-Pneumonia.—There is another trouble one often runs up against when he walks out among his pigs in the fall, or in fact at almost any time. He finds a half-grown animal, or even a mature one, breathing short and fast with a perceptible jerk in the flank and back of the heart along the shoulders. This is a pretty sure symptom of serious trouble, and is generally an unfailing sign of what is known as Swine Plague, or what would be called, in the human race, Pneumonia. This is a dangerous disease and is one of the "so-called" varieties of hog cholera and is really more dangerous. There is little that can be done with hogs in this condition. They should be given a warm, dry place to sleep, thoroughly rubbed with some strong heating liniment, that is penetrating, all along the sides; back of the elbow; between the fore legs; all about the vital organs; then, if in a shivering condition, cover them with blankets or something to keep them warm, and keep them where no draft or cold air can strike them. It would be well, in a severe case, to consult the family physician or a good Veterinarian with a view of giving them some internal treatment. The animals will appear very gaunt and probably refuse to eat. If this is the case there is not much hope. Exercise in this case is always fatal.

Sore Mouths.—Some breeders and farmers often have trouble with sore mouths among their pigs. There are two kinds of sore mouth that we have had experience with—neither of which need cause any trouble whatever. The more common cases are caused by the pigs fighting each other while nursing, and with their little sharp tusks (which are usually black), they strike each other on the sides of the face and jowl. This trouble can be stopped at once

by taking the pig, when it is three or four days old, and nipping off these little tusks with a very small pair of pliers, and washing the sore part of the face with a solution of any good coal tar dip.

This trouble could be avoided if one was careful to note, while the litter was sucking, whether or not there was any inclination for the little fellows to fight each other.

Canker Sore Mouth.—Canker sore mouth is very dangerous, and unless treated at once, a hard thing to cure; but what little we have had in our herd has been stopped in a day or two by using a soft cloth, wet in a solution of good dip (made quite strong) and thoroughly washing the mouth of the pig affected. If this is done daily, or even every two or three days, for three or four times, it will absolutely cure canker sore month—or at least it has done so in all cases we have had. If treatment is not commenced within a short time after the cankers are formed, the teeth will drop out and gums slough off and the pig die from the trouble.

Canker sore month, I am informed, results from the contamination with germs often found even in the soil; if there has been no other way of the disease being communicated, the ground should be thoroughly wet with a strong disinfectant. The sow's udder should also be thoroughly washed with disinfectant and the trough as well, and no further trouble is likely to occur.

Sore Feet.—It is not often that pigs are troubled with sore feet, yet sometimes, where they are kept and fed on frozen ground, the feet become sore and sensitive, which causes the pig to walk in a very peculiar manner. This is more often the case where hogs are very heavy and are obliged to walk on rough, hard or frozen ground. There are occasionally cases where sores break out around the hoof and between the toes. This is what might be called "foul in the foot," but is not considered contagious, being only a local trouble which irritates the part between the toes. Sometimes this is caused by being obliged to walk about a yard that is filled with cinders; these get between the toes and cause irritation. If such a yard is being used it would be well to cover the places over with sand and wet it thoroughly with a disinfectant.

If an animal becomes very lame wash the place two or three times daily with nitrate of potassium—saltpetre—and this will cool the irritated parts and relieve the trouble. Should proud flesh appear use chloride of zinc, one dram in a pint of water, once or twice daily. Keep the pigs in a dry place and feed them well. Proud flesh may be known by its appearance, which is bluish in color and spongy to the touch. This may be removed by an application of terchloride of antimony, which may be put on with a feather. This will usually remove proud flesh, after which the above treatment will heal the sores.

Sterility.—Generally speaking, there is not much trouble in the swine breeding business along this line, unless it be among highly fitted show animals, which have been forced by stimulating feed to a condition of flesh that is abnormal. Where this is the case, the

animal becomes so plethoric from being highly fed, that sometimes the tubes connected with the organs of generation are blocked up. There are also other causes, such as disordered ovaries; a morbid condition of the uterus; or hardening of the neck of the uterus. In a pig, on account of not being able to make an examination, it is difficult to find the cause and, if found, it would be difficult to remove.

If the animal is kept in only good growing condition, avoiding its getting too fat, there will seldom be any trouble. If the sow takes on fat very easily, and will not breed, give her two ounces of Epsom Salts, dissolved in half a pint of cold water; follow this with ten grains of Iodide of Potassium twice a day, in her feed, for two weeks. By this treatment one may succeed in absorbing the materials which have blocked up some of the tubes connected with the organs of generation. On the other hand, if an animal is very thin and in a weak, run-down condition, and fails to breed, give her good feed—all she will eat—and with this twenty to forty drops, according to size of animal, of tincture of chloride of iron, twice a day in the feed.

Rheumatism.—Rheumatism is very common among pigs; more particularly among quite young ones. It is hard to say what causes rheumatism in the pigs, as we often find it under various conditions—whether the animals are well kept or not.

Symptoms—Lameness in one or more of the legs; swelling of the hock joints or the fetlock joint. When these muscles are affected it may be a form of inflammatory rheumatism, which may cause some fever and sickness. In this case the animal would be stiff and refuse to eat; its breath will come quite short and fast; muzzle, or nose, will be dry, and if the animal is made to move about it will show signs of pain. Often it will shift from one leg to another.

Treatment—The animal should be kept in a warm, comfortable place and if it is in good flesh give it a dose of from one to two ounces Epsom Salts every three or four days, or two to three drops of Croton oil, which is a useful medicine in rheumatism.

For pigs, two or three months old, give half the quantity. It is well to rub the swollen joints with an equal mixture of turpentine and sweet oil.

Inflammation of Udder.—While this is not considered a disease, at times it causes some trouble—but not often.

Causes—Usually this is caused by an over accumulation of milk in the udder which is the result of overfeeding the sow on rich feed immediately after farrowing, or caused by the litter being too few in number or too weak to take all the milk that the sow furnishes, resulting in a feverish condition and soreness of the udder.

Symptoms—Udder becomes swollen and rather hard, and is hot to the touch. The skin will become red and very tender. When this is the case the sow usually shows considerable fever, loss of appetite and constipation.

Treatment.—If possible, draw off the milk, although this is a hard matter to do as the inflammation causes the milk to coagulate.

If the pigs are living allow them to nurse, yet this is bad for the pigs, as that usually starts the ailment in new born pigs known as white scours. Bathe the udder carefully with hot water, then use a half ounce of acetate of lead, with two ounces of tincture of arnica in one quart of warm water. This bathing should be done three times a day and the lotion applied after each bath. Give the sow two ounces of Epsom salts, followed with ten grains of nitrate of potassium, in a little water three times a day. If the udder becomes very hard or caked, rub with one dram of iodine and one ounce of vaseline. Apply this about twice a week until the udder becomes soft and pliable.

Sore Teats.—Once in a while, while nursing, the teats will become inflamed and swollen and, of course, are very sore. The sow will be inclined to refuse to let the pigs touch her. This only makes matters worse, on account of the accumulation of milk in the udder, and the result is a fever as above mentioned.

Cause.—This trouble is generally caused by the udder and teats dragging through the dirt or mud which irritates the skin, making it crack and become sore. It is also caused by the sow having traveled through poisonous weeds in the pasture, while wet with dew or rain.

Treatment.—Bathe three times a day with half an ounce acetate of lead in a quart of warm water. Then bathe with two ounces glycerine and tannic acid—twenty grains in four ounces of water well shaken.

Skin Diseases.—About the only skin disease that one is liable to have occasion to treat, is mange. This is caused by a parasite that burrows under the scurf skin and causes great irritation, practically destroying that part of the skin, so that a little scab forms. This, on account of great itching, causes the animal to rub and this disease soon becomes general throughout the herd. The scabs formed are rubbed and soon become a raw sore. The first appearance will be found on the thin parts of the skin; back of the ears; inside the thighs or upon the back. The parasite may be readily seen with a pocket magnifying glass.

When first discovered remove all unaffected pigs to buildings or grounds where affected pigs have not been.

Treatment.—First wash the pig all over with soap-suds, and then rub in dry sulphur. The sulphur coming in contact with the sores forms a compound that is poisonous to the parasite. Another sure remedy is to steep two ounces of stavesacre seeds in one and one-half quarts of water. Keep water nearly boiling for an hour, then add enough water to make up the quantity originally placed in the vessel. This solution, rubbed well into the skin, will kill both the parasite and its eggs. This may be repeated if necessary. Animals that are occasionally dipped with any of the coal tar preparations will never have mange. Prevention is better than cure. This is one reason why pigs should be either dipped or thoroughly wet with some of the foregoing dips as a preventive to any skin trouble.

CHAPTER XXIX

CASTRATING

This is a necessary matter that must be looked after, not only by the farmer who breeds for the general market, but by the breeder of pure-bred hogs as well. The best time for this operation is during the early period of the pig's life and at weaning time, for best results, and not left until the pig is six or seven months of age, or older. It is not so apt to be neglected by the farmer or feeder of market hogs, as by the breeder of pure-breds. It is astonishing, however, in either case, to see the great improvement after early castration, compared to a pig of the same litter left uncastrated. Some of the greatest barrows ever shown at the International Show in Chicago were selected, not so much for their superior merit at weaning time, but because they were not quite up to the standard to carry on and sell as breeders; yet after this operation their development so far outstripped the litter mates that there was no comparison. On the other hand, how often we see—especially at shows where a large amount of money is put up for prizes—a barrow that really is nothing more nor less than a “stag,” and evidently kept by the breeder for a long time, thinking he could be sold for a breeder, but not developing just right, he was finally castrated and fitted for a barrow show. The expert barrow Judge, however, soon discovers this fact and avoids much further attention to him in the ring.

A Practical Method.—Wash the parts clean with pure water to which has been added any good coal tar dip, making it rather strong, and with a sharp knife make an incision over both testicles as small as possible, to remove the testicles, and low down, so as to drain thoroughly. Press the testicles through the openings, drawing the cords well out, and scrape apart rather than cut them off.

Then, with a soft cloth, cover the parts with full strength coal tar dip, and if the operation has been perfectly clean, the pig will be entirely well in a week or so, without any bad after-effects.

Spaying.—This is an operation on the female and is not often practiced. In fact, I seldom hear of a bunch of sows being spayed. It is an operation that requires much more care and knowledge, than castration of males.



PROF. JOHN M. EVVARD

HOW TO FEED YOUR HOGS

BY JOHN M. EVVARD

PART II

CHAPTER I

WHAT CONSTITUTES AN ADEQUATE RATION

It is no easy matter to compound a successful ration on paper; in truth, it is almost impossible to do so without having had considerable experience with the different feeds and also having at hand a more complete analysis than is ordinarily given us by the chemist.

To illustrate that one of our greatest feeds, for instance corn, is woefully incomplete in itself, it may be well to mention a recent experimental test by the Animal Husbandry Section of the Iowa Experiment Station in which we fed three groups of pigs in dry lots as follows:

Group A: Shelled corn, self-fed, plus block salt, self-fed.

Group B: Shelled corn, self-fed, plus bone material, self-fed, plus block salt, self-fed.

Group C: Shelled corn, self-fed, plus meat meal tankage (60 per cent protein), self-fed, plus block salt, self-fed.

The pigs were started out at the nice weanling weight of practically 42 pounds, and were fed 150 days. They were more than 7½ months of age at the close of the test. The pigs receiving corn only in separate feeders made an average daily gain of .1 of a pound, consuming per head daily 1.56 pounds of shelled corn, in addition to a little salt. They weighed at the end of the feeding period, when they were practically 8 months of age, 57.34 pounds. Think of it! Pigs weighing 57 pounds when 8 months old. What is the trouble? Is it with corn? Hardly, because corn is a healthful feed. The big difficulty was that some other things should have been provided in the ration that were not, and these should have been such as would have supplemented the deficiencies of corn. On this corn ration it took 1,446 pounds of corn to produce 100 pounds of gain, and, in addition to this, a little more than 2 pounds of salt—a total of 1,448 pounds of feed for every 100 pounds of gain put on.

Now the addition of bonemeal which carries a little protein with it helps some. The pigs gained 50 percent more or .15 of a pound

daily, and they had little better appetites, eating practically 2 pounds of grain per head daily and required 1.297 pounds of corn plus 10 pounds of bone meal plus 1 pound of salt for 100 pounds of gain, a total of 1308 pounds of feed approximately. There was still something wrong because eight-months-old pigs at the close should weigh more than these weighed, or, namely, more than 65 pounds.

The addition of 60 percent protein meatmeal tankage made a vast difference. The pigs gained 12 times as fast as where they received corn alone, making more gains in one day than the corn-alone pigs made in 12, or 1.21 pounds daily. Also they ate three times as much feed, or 4.40 pounds of corn plus .58 of a pound of tankage plus a little salt—a total of almost 5 pounds, or, to be exact, 4.98 pounds; requiring for each 100 pounds of gain 366 pounds of corn, plus 47 pounds of tankage, plus a little more than .1 of a pound of salt, or, practically speaking, 413 pounds of feed for every 100 pounds of gain.

These pigs weighed 226 pounds at the same age as the corn-alone pigs or the corn-and-bonemeal pigs, or 226 as compared to 57 and 65 pounds, respectively. Certainly there must be something in meatmeal tankage that supplies the deficiencies of corn; there must also be something in the corn and salt ration that is inadequate.

To study this matter more fully, let us consider what we mean by a complete ration, a ration that is adequate, particularly for growing pigs and suckling sows with litters.

A Complete Ration.—A complete ration is relatively complex. It is made up of many factors, many of these are unknown chemically, unfortunately, although we know their action. Chemical analyses, therefore, although difficult to make, are, ordinarily speaking, only to be considered as general guides. Why this is so we shall make plain shortly. Feeds vary considerably, particularly pasture feeds. Young bluegrass, for instance, may come out in the early spring running as high as 40 percent protein in the young dry matter; and later it may contain only 10 percent of protein in the old dry matter; that is, after it becomes dry, hard and woody. This protein in the mature plant is certainly not the same as the protein in the young, tender, luscious green growth. There are proteins and proteins, so many hundreds of thousands of them that it is almost impossible to conceive of their complexity. Actually different combinations are difficult to work out, unless they are experimentally tried out, and it has been our policy at Ames for a number of years to try out various combinations in practice and see what they will do, and then learn from our experiences with them.

Let us remember before passing to the factors that make up an adequate diet that a ration may be good because of the absence or presence of an undesirable or desirable quality respectively, or bad

because of the absence of an essential or because of the presence of a non-essential. It is futile, therefore, to try to look for a material something, specific in the corn ration, that is causing difficulty with pigs, so experience teaches us. We want to look for something that is to be found somewhere else, and add it to the corn ration, and thus overcome the difficulty.

Balancing a Ration.—When we balance rations we must remember that the demands of animals change. A young, growing pig requires an entirely different ration than the same pig after it has reached maturity and is ready to go to market. The brood sow during gestation requires different feeding than the same sow during the suckling period, and so on. The weather and external factors are of some importance, for instance, cold weather may have its particular demands for heat-producing feeds. After all, there is a great possibility of combinations that will work, and it is surprising how many good combinations there are when we come to studying feeding.

The making up and feeding of a swine ration may be compared to the building of an automobile. We need building material to make a pig, such as protein which makes up the muscle, part of the bone, some of the hide, the hair, and so on; calcium phosphate or bone ash, which will help build the bone; fat, which will act as a bodily reserve, cushion, and perform other functions. These materials are necessary. In the automobile we need steel, iron, wood and other materials. The pig needs fuel or feed to "keep him going." It is supplied by corn, milk, alfalfa, rape, and so on, the auto engine taking gasoline. The pig takes water and air to cool himself, and the engine uses for the same purpose the same material. The pig has nerves in his body to transmit his impulses; the automobile has electric wires. The pig has lungs to mix the gasses, and take out of them what is necessary, while the engine has its carburetor. The pig has various organs that tend to keep things in tune, rightly timed, such as certain portions of the brain and so on, and the engine has a timer. The pig has nerve-endings in the muscle and in other tissues that really may, in a sense, be considered as a seat of activity, whereas the engine has spark plugs, where the vital spark that sets the whole thing in motion is set off.

The engine to run right must be in perfect order, all parts complete. So a ration to serve the highest function must be almost perfectly compounded—all factors must be present and in the proper proportion if the pig fed thereon is to gain the fastest and in the least possible time. But what are the essential factors of growing rations for pigs?

The Function of Water.—First, water—water in abundance. Water performs among others these functions: Supplies building material; regulates the heat through evaporation, ingestion, and excretion; acts as a solvent, thus facilitating chewing and swallowing. Water furnishes some 68 or more pounds out of pigs and other ani-

mals' blood. It is a cleanser, promoting laxative effects and thus indirectly ridding the body of undesirable products. Animals nearly always void more water in the excreta than they take in the solid food. Water, therefore, is very essential, and should not be neglected.

Protein Another Essential.—Protein of good quality must be present. There are proteins and proteins. Proteins are made out of 18 different building stones called amino-acids, and these 18 basal elements are combined and re-combined in various and diverse ways so as to make a large number of proteins, the number running into hundreds of thousands. By quality we mean that the right proportion of these proteins and building stones should be present, one as compared to another, and it is highly important that the protein mixture should be commensurate with the needs of the organism that consumes it.

Only those amino-acids which are necessary for growth and development should be present, or else their precursors; that is, the amino-acids which can be rebuilt into the essential ones, although this is probably done only to a limited extent. To give a better idea of this the protein quality, zein, which comprises about half of the proteins of corn, is poor because this particular protein does not have any tryptophane or lysine in its make-up, and these two amino-acids are absolutely essential to growth and development. When one balances up corn, therefore, he must look to those feeds that contain these two amino-acids particularly. That is why one looks to milk, and meat products, and alfalfa pasture, and rape pasture, and young tender bluegrass to supply these deficiencies.

The protein quantity must be right. There must be enough of the right "quality mixture," and this quantity will vary as the feeding period progresses. It will be different when the animal is young compared to when it is old and mature. The amino-acids that are in greatest demand in younger life are not so badly needed in later life, neither from the relatively qualitative nor the quantitative standpoint. Every one knows that a quite young growing lard type pig, for instance, will require as much as 20 pounds of tankage with 100 pounds of corn in a drylot, but the same pig when he weighs 300 pounds only takes a pound or two of tankage with 100 pounds of corn. Now to reverse this process and give 1 percent tankage when the pigs are young and gradually increase it to 20 percent when they are old, would be to turn things topsy turvy, and to promote inefficiency.

Minerals Must Be Present.—Mineral quality is highly important. We must have the right kinds of minerals present in the proper proportion one to the other. It is essential that such minerals as calcium, a material that forms 40 percent of the dry ash of bone; and phosphorus, one of the basal elements of bone and essential to bodily development; and sulphur, a constituent of the proteins; and magnesium, for general metabolism; and sodium, absolutely in-

dispensable for correct stimulation of the heart and other tissues; and others that are of great importance be present. Calcium and phosphorus of course can be had in bonemeal; the sodium can be secured in common salt, and so on. Nearly all of these minerals are present in most feeds, but most feeds are always deficient in certain ones, such as corn for instance, or wheat, or rye, or barley; in truth, there are only a few feeds that contain approximately correct mineral quality, and one of these is milk. Others that are good are alfalfa pasture or rape pasture, particularly when these two are combined with corn. That minerals be present in the proper proportion one to the other is essential, but there must be enough of each to supply the demands of the particular pig that is being fed.

Certain Vitamines Needed.—A peculiar chemical unknown which is labeled fat soluble A, must of necessity be present, else the pig will not thrive. This particular material we know the action of, but we do not know its chemical constituents. We know that under certain conditions it is soluble in fat, as it was first discovered in butterfat; hence the reason for its name. We have also found it in egg yolk and in the lighter fractions of beef fat, but not in lard, nor in olive oil, nor in cottonseed oil. A little is apparently present in corn oil, but not enough. Our best swine feeding sources of this material is alfalfa leaves, rape leaves, clover leaves, and most assuredly milk; although in milk this material, remember, is found to a large extent in the butterfat, being only about one-thirtieth as soluble in the liquid of the milk as in the fat portion. It has recently been found that carrots contain this material to the extent of about one-third as much as in equal weights of butterfat. It is presumed that other root crops carry this fat soluble A, and if they do here is one reason for adding roots, for instance, to a corn ration, but ordinarily in limited quantity in order to supply this essential nutritional ingredient. This is a necessary factor in the ideally good ration.

There is another peculiar unknown chemical material or vitamin known as water soluble B. It receives its name like fat soluble A because of its solubility properties. It was first known to be soluble in water and alcohol, and some refer to it by the double-headed title of water and alcohol soluble B. This particular factor is found in most grains and plants, but is lacking in polished rice, for instance, and because it is lacking in polished rice we find pigeons and other animals fed exclusively thereon developing a nerve disease known as polyneuritis, a disease of many nerves; people also get it. Peculiarly enough, this material is found in the rice bran or rice polishings, but when we use rice for human consumption we take the bran off, and then eat only the white or the more fashionable white inner kernel. Wheat embryos are rich in this B material, and inasmuch as wheat embryos are carried in the milling over to the wheat middlings, here is one reason why wheat middlings may be a good feed under certain "deficiency of water

soluble B" conditions. Prof. McCollum, of Wisconsin, says in regard to water soluble B: "It is universally present in foodstuffs of vegetable and animal origin." Hence, generally speaking, we need not worry much about its absence from pig rations, although under some certain conditions it may not be present.

Antiscorbutic Substances Seemingly Necessary.—There is another class of materials known as Antiscorbutic Substances which are apparently essential in the diet or ration if complete adequacy is to be approached. Oranges, limes, grape fruit, milk, meat meal tankage, alfalfa, clover and other food materials carry these substances. Orange juice is given to babies that are on a boiled and raw milk diet—because empirically it has been found of much advantage. Recently Dr. Hess of New York has shown that a properly prepared juice solution of oranges could be injected into the veins of a baby and cure scurvy—a constitutional condition which results when these *Antiscorbutics* are absent. We have seen the disease scurvy in guinea pigs receiving an *oats* ration. A little milk would not cure it but much would if the disease was not too far advanced. Cabbage was a fine preventive—hence presumably rape pasture is splendid inasmuch as it is a near relative of cabbage. English sailors are sometimes called "Limies" because of lime fruit being given to them in their rations as a preventive of scurvy. When finally these Antiscorbutics are traced down to their real basal makeup we may find a single substance doing the work rather than a number, two or more, of the now designated "*Antiscorbutic Substances*."

Energy Builders.—Sufficient net-energy materials must be provided. These will furnish the energy materials for growth, for general development, for movement, and yet supply an excess for conversion into fat and other general tissues. In this respect, of course, it is best to supply feeds that have a large amount of that energy per pound of feed consumed, because it takes fewer pounds of higher energy feed to do the same business, and inasmuch as the alimentary capacity of pigs (as compared to cattle) is somewhat limited by natural inheritance, the more concentrated the feeds, other things being equal, the more likely they are to grow fast and fatten quickly. Timothy hay, even though properly balanced with milk, is a poor feed for pigs, because it is too coarse and fibrous; in other words, too woody. It is not concentrated enough; there is too much fibre relatively in it. On the other hand, corn or wheat are very efficient because they supply many more heat units or energy per pound weight than coarser materials, such as rough bran, corncobs, and other such feeds. Some feeds contain so much fibre and are so bulky, that an animal expends more on the gathering, chewing, swallowing, digesting and assimilating than he gets out of them. For instance, from peanut shells or certain kinds of wood ground up, an animal extracts nourishment by eating these, but it cost so much to get the nourishment out that he is the loser rather than the gainer. Why rob Peter to pay Paul if it's all in the family?

All Factors Must Be Combined.—A correct relationship, one to another, of all of the factors named is required. This is a problem for the wisest of sages. Here is where the appetite of the pig comes in splendidly; oftentimes because he can select his own ration pretty well. Of course he makes mistakes, but under proper conditions he usually gets there in excellent shape.

Grind Hard Grains.—Suitable physical preparation is necessary. Hard seeds, such as wheat, should be ground or soaked, perhaps both, rye the same, barley the same. Grains that have a hard outer husk, such as oats, should be well ground. Feeds that have an outer coating that is tough and fibrous, such as kafir or grain seeds, would need to be finely comminuted. Ear corn needs very little, if any, preparation for young growing pigs, because they do better when they pick the corn off the cob, and chew it up themselves, than when it is ground for them; that is, they make more economical returns per day and per pig. Some feeds require to be cooked, like potatoes, to break down the starch granules, and make the feed more palatable. Generally speaking, however, the right kinds of physical preparations depend upon the objects sought, and would need to be given special study.

Now that we have gone quickly over the essentials of an adequate ration, it is well to mention some things that we should avoid in making up a mixture of feeds which we wish to use so as to get the most out of them.

Avoid Poisonous Substances—First. We must avoid poisonous materials, being careful, for instance, of cottonseed meal for this reason. We want to be careful of rye, because it sometimes contains ergot, which will cause trouble—abortion and other disease. We want to be careful of salt brine, which meat comes out of, because it is poisonous to pigs, if drunk in large quantities.

Second. We want to avoid excessive fibre in a pig's ration. The pig is constituted much like the human being, and can not handle a large amount of fibre, hence timothy hay is a poor feed for pigs. Oat straw makes a fair bedding, but it is almost worthless as a feed. The same is true of rye and wheat straw. Walnut shells and hickory nut shells for the same reason are not used for swine. One of the big reasons why it takes sometimes as much as 50 percent more of standard wheat middlings to produce the same amount of gain as 100 pounds of concentrated corn grain, is because of the greater amount of fibre present. Light-weight oats are poor for pigs, because of the large amount of hull present, with its correspondingly high percentage of fibre.

Third. We want to stay away from inert materials which place a useless burden on the organism. In this respect we might mention sand, dirt and similar materials. Of course it may be that certain limited amounts of these so-called inert materials, such as sand and certain kinds of earth, would be beneficial, but generally

speaking if a feed is mixed with considerable sand and earth, it is relatively undesirable.

Efficient Use of Cereals.—It is well to know something about the proper use of the cereal grains which are largely used in pork production. If you take the grain or seed alone of wheat, or oats, or corn, or barley, or rye, or kafir, or Milo maize, and attempt to make young pigs grow satisfactorily on any one of these, we find that when we feed them alone there is very little growth, and if the pigs are young enough and of a very light weight when we start, many of them may die. If protein alone is added it helps a little, but not enough, and although we get a little growth, perhaps an increase in live weight, yet the ration is manifestly very inadequate. Add the Vitamine Fat Soluble A naturally mixed with butterfat, as it actually is, and it helps very little. Add a mineral mixture alone and it helps some, but the ration is inadequate. Add protein and yellow butterfat (which always carries the Fat Soluble A) only, and we still do not get desirable results. Add protein and mineral mixture and we get somewhat better results than with protein alone or the mineral mixture alone, but still unsatisfactory. Now if we add a correct mineral mixture and the material found known as fat soluble A (found in butterfat or alfalfa leaves or carrots) and also a satisfactory protein we, generally speaking, get good growth and development because we have supplied the grain's shortcomings. In other words, all of these deficient materials must be present at one and the same time in order to give good results. These materials, of course, which the grains lack in sufficient quantity, must be given with plenty of water, and in the proper proportion if optimum results are to be secured.

If we take all of these above mentioned grains and mix them in toto one with another in different and diverse proportions, we still have an inadequate ration. It takes other feeds than these grains to make up the ration, so that it is practical and efficient. Add milk to any one of these, or to a mixture of any two or more, and you get splendid results, generally speaking. Add alfalfa pasture and the results are surprising. Add meatmeal tankage and the results are splendid. That is because milk, and alfalfa pasture, and meatmeal tankage contain all of the different deficient materials, and thus in practice the allowance of the deficiencies is simplified, because we know that certain feeds are rich in just the necessary nutritional materials that go to balance the grains.

Commonly, the quality and quantity of the proteins of these ordinary grains are improved greatly by the leaves of plants, such as those mentioned, or the plants of alfalfa, rape, red clover, young tender bluegrass, sweet clover, white clover, Alsike clover, and others. The meat by-products overcome these deficiencies, particularly when allowed in the form of meatmeal tankage; bloodmeal is also of importance. Fortunately the fat soluble A material can also be secured in milk, and the leaves of plants, and to a con-

siderable extent in meatmeal tankage, if properly prepared. The mineral material is also supplied by the leaves of plants, the milks, meatmeal tankage, and also may be furnished directly by the use of ordinary mineral mixtures made up of limestone, bonemeal, sulphur, wood ashes, Glauber's salts, common salt, and so on.

Prof. McCollum, pioneer in biological nutrition investigations, has recently written: "It is not possible to make up a diet, derived solely from the seeds of plants, which will support normal growth and health." It is presumed of course that the animals will be fed on a mineral-free water or, as McCollum puts it, "Provided salt-free or nearly salt-free water, such as rain water, distilled water and some of the pure and natural waters used for drinking."

Plant Leaves Balance Rations.—Prof. McCollum, now with Johns Hopkins University in Baltimore, has done a wonderful work to simplify the principles of nutrition. He is a great believer, because of being made so by the results of his investigations, in the leaves of plants for the balancing of grain feeds. So are good practical swinemen. They have long since learned that the leaves of plants, particularly the leguminous plants, alfalfa, red clover, rape, green tender bluegrass and peanuts, are of great importance in balancing the swine grain ration, and in speaking of this we can not but well again quote from this noted authority:

"Pigs have in farm practice frequently been stunted and reproduction has been interfered with as the result of being fed too largely on seeds and by-products of seeds when confined in pens nearly free from vegetation. Under these conditions they get an inorganic supply (mineral) which is not of suitable character, and run short of the unidentified growth stimulant factor, fat soluble A. In many cases they also receive proteins of relatively poor quality. These dietary faults are sufficient to undermine the health of the animal. When, however, the leaf is fed with seed, highly successful nutrition has been secured. Simple mixtures such as 60 per cent of rolled oats with 40 percent of alfalfa flour, prepared by grinding and sifting the dried leaves, were capable of promoting normal growth and well-being when fed throughout life. The reason for this is clear. The leaf portion supplies the fat soluble essential in which the seed is deficient, and also makes good the particular mineral elements contained in insufficient amounts in the seed. Similar mixtures of wheat or corn with alfalfa-leaf flour, promote the well-being of animals in a manner which we have never been able to successfully imitate with mixtures of seeds."

Let us say to Prof. McCollum in these respects that swinemen have long ago found out that what he says is true gospel in that alfalfa is most thoroughly appreciated, as is red clover, in the great corn-alfalfa regions of the west and eastern sections; in truth, in all sections where alfalfa and clover are grown and used for swine feeding.

Without making this discussion too technical, it is well to present the representative chemical analyses which will give the swine feeder an idea as to the amount of water, protein (muscle, bone, hide, hair, hoof, and nerve-builders); carbohydrates, fibre excluded (a material that furnishes the energy that is converted into work and fat); crude fibre (the stuff that is not very valuable for swine feeding, in truth, only a little of it is needed, excepting perhaps in satisfying the appetite or capacity of the brood sow, and it is easy to even overdo with her); fat, called sometimes ether extract (a material that is converted into animal fat in the body or may be used to furnish heat or to furnish energy for work); and mineral matter (ash) (the stuff that makes up bone, that furnishes the stimulants that keep the heart beating and the blood moving and all of that sort of thing). Of course in this table no attempt is made to distinguish between the different kinds of proteins, or fats, or to show just how the mineral matter is made up, but in general the analyses as given are those customarily presented in standard works on feeding and are helpful in teaching one to appreciate in general how feeds are made up chemically.

Carbohydrate Equivalent.—In addition to these constituents there is given the carbohydrates or starch equivalent which is secured by adding together the carbohydrates, fibre and fat (multiplying the fat, however, by 2.25). This summation is known as the carbohydrate or starch equivalent. This represents in a way the gross possible fattening materials present, although it gives but little indication as to how much energy is needed to convert these into growth and fat. The protein of a feed may be used, when an excess is present, in the making of fat, or for furnishing energy, but in practice protein, being quite expensive relatively, had best not be purposely fed in great excess, although plenty for normal use should be present. There is also given the ratio or number of pounds of fattening material present with every pound of protein. This is quite useful in that it shows which feeds are of a narrow ratio, and which may be used in balancing the grain rations that have wide ratio. For instance, corn has a wide ratio of 7.9, according to these round figures. Now to balance it for young growing pigs one would need to feed with it such feeds as tankage with a narrow ratio of .53, or skimmilk, with a ratio of 1.3, or buttermilk; with a ratio of 1.3, or bloodmeal, with a ratio of .04.

This table can be used as reference, and should be particularly studied from the standpoint of the water content of feeds because the more water a feed has in it, other things being equal, the less its net value. Remember, it is the dry matter that counts. A feed which is marked 7 percent water, such as meatmeal tankage, has 93 pounds of dry matter in every 100, whereas skimmilk, which has 90 percent water, has only 10 pounds of dry matter in 100. Of course we would not expect 100 pounds of skimmilk to be as valuable with only 10 pounds of dry matter in it as 100 pounds of meatmeal tankage, with 93 pounds of dry matter in the same weight. Mangels, for instance, contain 91 percent water or only 9 pounds of dry

matter in 100 pounds of roots. Now roots are good feeds, but they are very bulky because of their high water content. A pound of potatoes ordinarily will go much further than a pound of mangels, because in every 100 pounds there is present 21 pounds of dry matter or over two times as much as the 9 pounds in the same weight of mangels.

SWINE FEEDS—COMPOSITION

To Be Used as a General Guide

Most feeds vary enough so that figuring them to the 2nd decimal point is not a reasonable procedure. (All figures given in round numbers of pounds to the hundred.)

Basal Feeds

	Water.	Protein (Muscle, Hair, Hide, Hoof, Nerve and Bone Builders).	Carbohydrates (Fibre Excluded). (Fattening Material).	Crude Fibre (Gives Bulk).	Fat (Ether Extract).	Mineral Matter (Ash) (Bone ^{##} Building and Stimulating Materials).	Carbohydrates or Starch Equivalent (Fattening Material).	Ratio—Pounds of Carbohydrate Equivalent (Fattening Material). for each Pound of Protein.
Corn (Indian maize), grain.....	14	10	68	2	4	2	79.0	7.9
Corn and cob meal.....	14	8	64	8	4	2	81.0	10.1
Barley.....	12	12	67	5	2	2	76.5	6.4
Wheat.....	11	12	71	2	2	2	77.5	6.3
Rye.....	12	11	71	2	2	2	77.5	7.0
Sweet sorghum seed.....	13	9	70	2	4	2	81.0	9.0
Kafir corn.....	12	10	71	2	3	2	79.8	8.0
Milo maize.....	12	10	71	2	3	2	79.8	8.0
Peterita.....	12	11	72	1	3	1	79.6	7.2
Hominy feed (fat extracted).....	11	11	66	6	4	2	81.0	7.4
Hominy feed, ordinary.....	11	10	63	6	9	2	89.3	8.9
Emmer or speltz.....	12	11	61	10	2	4	75.5	6.9
Potatoes.....	79	2	18	...	...	1	18.0	9.0
Peanut kernels.....	8	26	17	2	45	2	120.3	4.6

Supplementary Feeds

	Water.	Protein (Muscle, Hair, Hide, Hoof, Nerve and Bone Builders).	Carbohydrates (Fibre Excluded) (Fattening Material).	Crude Fibre (Gives Bulk).	Fat (Ether Extract).	Mineral Matter (Ash) (Bone Building and Stimulating Materials).	Carbohydrates or Starch Equivalent (Fattening Material).	Ratio—Pounds of Carbohydrate Equivalent (Fattening Material) for each Pound of Protein.
Meatmeal tankage, high-protein.....	7	60	5	2	11	15	31.8	0.53
Meatmeal tankage, low-protein.....	7	40	10	4	11	28	38.8	0.97
Whole milk.....	86	4	5	0	4	1	14.0	3.5
Skim-milk.....	90	4	5	0	.....	1	5.0	1.3
Buttermilk.....	90	4	5	0	.....	1	5.0	1.3
Linseed oil meal, old process.....	10	33	36	8	7	6	59.8	1.8
Bloodmeal.....	9	85	2	1	.....	3	3.0	0.04
Soy beanmeal.....	12	33	29	4	.....	5	71.3	2.2
Canadian field peas.....	10	25	56	5	17	3	63.3	2.2
Peanut meal (without hulls).....	8	42	23	8	14	5	62.5	1.5
Peanut meal with hulls.....	8	35	22	22	9	4	78.3	1.8
Oats.....	12	12	55	12	5	4	78.3	6.5
Oatmeal, without hulls.....	9	14	66	3	6	2	82.5	5.9
Middlings, flour, wheat.....	11	18	58	4	5	4	73.3	4.1
Middlings, standard, wheat.....	11	17	56	7	4	5	72.0	4.2
Bran, wheat.....	10	16	54	10	4	6	73.0	4.6
Cottonseed meal, high grade.....	8	42	25	10	7	6	50.8	1.2
Beans, cull.....	13	23	52	6	2	4	62.5	2.7
Gluten feed, corn.....	10	26	51	7	4	2	67.0	2.6
Gluten meal, corn.....	9	36	48	2	4	1	59.0	1.6
Oilcake meal, corn.....	9	22	47	10	10	2	79.5	3.6
Alfalfa hay, very high grade, leafy.....	12	20	37	20	3	9	61.5	3.1
Alfalfa leaves.....	10	24	38	12	3	13	56.8	2.4
Clover, red, hay, high grade.....	12	16	41	20	4	7	70.0	4.4
Artichokes.....	80	2	15	1	.....	2	16.0	8.0
Beet sugar.....	83	2	13	1	.....	1	14.0	7.0
Rutabaga.....	89	1	7	1	.....	1	8.0	8.0
Mangel wurtzel.....	91	1	6	1	.....	1	7.0	7.0
Sweet potato.....	70	2	25	1	1	1	28.3	14.2

Miscellaneous Feeds

	Water.	Protein (Muscle, Hair, Hide, Hoof, Nerve and Bone Builders).	Carbohydrates (Fibre Excluded) (Fattening Material).	Crude Fibre (Gives Bulk).	Fat (Ether Extract).	Mineral Matter (Ash) (Bone Building and Stimulating Materials).	Carbohydrates or Starch Equivalent (Fattening Material).	Ratio—Pounds of Carbohydrate Equivalent (Fattening Material) for each Pound of Protein.
Cobmeal, corn.....	12	2	50	34	.....	2	84.0	42.0
Bran, corn.....	10	10	62	10	6	2	85.5	8.6
Hulls, oat.....	8	4	50	30	2	6	84.5	21.2
Apples.....	82	1	16	1	1	1	19.3	19.3
Acorns, entire.....	30	3	43	19	4	1	71.0	23.7
Acorn, kernel.....	32	4	47	9	6	1	69.5	17.4
Hulls, peanut.....	9	7	19	57	2	6	80.5	11.5

Note:—Less than one (1) is indicated with a — or — — sign. Some very practical points, fundamentally practical, have been covered, but yet when it comes to feed practice it is difficult to remember all of these various and diverse details, so therefore we will proceed to more practical feed lot considerations.

To Balance a Ration.—In balancing the ration we must, after selecting the right feeds—feeds that, properly compounded, supply the main essentials of the ration—pay attention to the mixing of the feeds, so that they will be rich enough in protein to do what is expected of them. We must take into consideration other essentials, such as the quality of protein, the presence of fat soluble A, and water soluble B, and so on, but by using certain feeds we can be fairly certain that we are supplying these main essentials; hence with the right feeds, if we combine them so as to have the ration rich enough in protein, we shall get along pretty well. It must be remembered, though, that we must “mellow” our figures with the learned results of experience—experience which is one of our most valuable teachers.

In the table of analyses we give the corn ratio as 7.9, which really means that with every pound of protein present in corn there is mixed with it 7.9 pounds of carbohydrates or their equivalent. The ratio, which in this case is a crude ratio and not nutritive (because it is based upon crude and not digestible nutrients), is secured by dividing the number of pounds of protein into the carbohydrate equivalent, which carbohydrate equivalent is secured by adding the carbohydrates (68 pounds in 100) to the fibre (2 pounds in 100) and to the fat (4 pounds of fat in 100, times 2.25 equals 9 pounds of carbohydrate equivalent, because we find that in practice that a pound of fat is equivalent to about $2\frac{1}{4}$ times a pound of starches or other carbohydrates in feeding value).

Add these figures, 68 plus 2 plus 9, and we have 79 pounds of carbohydrate equivalent in 100 pounds of 14 percent moisture corn. The 79 pounds, which in this case includes very little fibre, will give practically the same results as if all were carbohydrate. Of course we must remember that the fibre for pig feeding is really of practically little value, hence not the equivalent of starches or sugars. Now, take this 79 pounds and divide by 10, the number of pounds of protein, and we have the figure which is the ratio, 7.9. Now this corn ratio is called a “wide” one, being unsuitable for growing pigs or suckling sows or young boars because there is too little protein in proportion to the fat-forming elements, or, stated conversely, too much carbohydrates or their equivalent for the amount of muscle, hide, hoof, nerve, hair and bone builders, or namely, protein, present.

There is one class of hogs—fattening brood sows discarded from the breeding pen—which in addition to the real heavy, well-grown, mature stock or store hogs, that can do quite well for a short time on such a wide ratio. This wide ratio is also all right for maintenance of mature swine. We find in practice, and this is borne out by experiments, that corn alone for the finishing off period on such heavy, well-grown sows or other fairly mature stock in the swine lots is all right for a limited period. Generally speaking, however, practically for all swine classes, more protein must be added to corn, and incidentally more of the other essentials of a good ration, to get “results that count.”

What ratio should we figure on feed for the different classes of swine? We can only give this approximately because it varies, depending largely on the quality of protein, and character of the carbohydrate equivalent, but assuming a rather good quality of protein present, and average carbohydrate equivalents, we find that the approximate practical ratio to allow different classes of swine is, in general, as follows:

Class of Swine	Weight, Approximate, Pounds	Ratio, or Number of Pounds of Carbohydrate Equivalent With Every Pound of Protein	Pounds 60% Meatmeal Tankage Necessary to Feed with 100 Pounds of Corn Grain in Order to Make the Approximate Ratio Named
Pregnant gilts.....	200-350	4.5-5.0	10-15
Pregnant sows, yearlings or over.....	350-600	5.5-6.0	6-8
Suckling sows with litters.....	200-600	3.5-5.0	11-25
Growing and fattening hogs.....	30-100	3.5-4.0	18-25
	100-150	4.5	15
	150-200	5.0	11
	200-250	6.0	6
	250-300	7.0	1-2
	300-350	8.0	0-1
Breeding pigs.....	30-100	3.5-4.0	18-25
	100-150	4.5	15
	150-200	5.0	11
	200-250	5.5	8
	250-300	6.5	4
	300-350	7.0	2-3
Boars, young.....	300-500	5.5-6.5	4-8
Boars, mature.....	500-1000	6.0-7.0	2-6

It is to be re-emphasized that these figures are approximate, but nevertheless they can be used as a good general guide. Remember, that this is drylot feeding. On pasture it is well to follow the recommendations given for pasture as to the amount of tankage or its equivalent. It is to be remembered that pigs on pastures get most of the protein from them, particularly if the pasture be alfalfa, rape, red clover, green rye, green wheat, or young tender bluegrass, and it is ordinarily difficult to estimate just how much material pigs get from such pastures; hence we have to approximate the ratios to allow on them, basing our figures largely on our practical experience.

Ratio for Breeding Pigs.—In order to convert the tankage in the above table into skim milk, multiply by approximately 20. For instance, breeding pigs require ratio of about 3.5 to 4.0, which is secured by allowing 25 to 18 pounds of tankage with every 100 pounds of corn. If skim milk is used, it will take twenty times as much as the 25 to 18 of tankage or 500 to 300 pounds of milk with every 100 pounds of corn, or from about 5 to 3½ pounds of milk (skim or butter) with every pound of corn grain. This conversion is not absolutely accurate, but it is approximately what we wish, and should give good general results.

One can now figure for himself on the basis of what has been said any ration that he wishes. Suppose you have pigs weighing 75 to 100 pounds to feed. Look on the table and you will find that

this will require a ratio of close to 4. Let us call it 4, for general purposes, and figure out a ration on the basis of this ratio. We have available corn grain, flour middlings, and 60 percent protein meatmeal tankage. The first thing to do after determining the ratio is to look up the analyses for these three feeds, marking down the protein and carbohydrate equivalents in separate columns, thus:

	Pounds in a Hundred	
	Protein -	Equivalent
Corn grain.....	10	79
Wheat middlings.....	18	73.3
Meatmeal tankage.....	60	31.8

A practical man knows about how these materials should be fed in feeding young pigs. Let us go on the basis of using 100 pounds of corn, mixing with it or feeding along with it whatever we need of the two different feeds—wheat-flour middlings and meatmeal tankage—to build the whole ration up, or to balance the corn. We will decide off-hand that we want to feed 50 pounds of middlings with 100 pounds of corn; so that is definite. It will be necessary, then, to feed considerable tankage to bring the ratio right. Let us now figure the ratio of the mixture composed of 100 pounds of corn and 50 pounds of wheat flour middlings.

The Basal Allowance, Pounds	Pounds in Allowance	
	Protein	Carbohydrate
In 100 pounds of corn grain.....	10.0	79.0
In 50 pounds wheat middlings, 50% or one-half as much as in 100 pounds.....	9.0	36.6
In 150 pounds of the mixture.....	19.0	115.6

The ratio secured, therefore, is 6.08, got by dividing 115.6 by 19. This is not rich enough in protein. It will be necessary to add some high-protein tankage to the mixture. Let us add 10 pounds and see how it figures:

The New Mixture	Pounds in Allowance	
	Protein	Carbohydrate Equivalent
In 150 pounds of mixture (100 pounds corn plus 50 pounds middlings).....	19.0	115.6
In 10 pounds meatmeal tankage.....	6.0	3.2
Total in 150 pounds of the mixture plus 10 pounds tankage....	25.0	118.8

This gives a ratio of 4.75, which is secured by dividing 118.8 by 25. The mixture is still not rich enough in protein, hence we shall have to add some more tankage. Let us, therefore, add 10 pounds more of tankage to the new mixture, which we have made up, so that instead of having 100 pounds of corn, 50 pounds of middlings and 10 pounds of tankage, we shall have 10 pounds more of tankage added thereto. The figures for this follow:

	Pounds in Allowance	
	Protein	Carbohydrate Equivalent
We have already found the mixture composed of 100 pounds corn, 50 pounds middlings and 10 pounds tankage, a total of 160 pounds, to be.....	25.0	118.8
Added in the 10 pounds of meatmeal tankage.....	6.0	3.2
Total in final mixture of 170 pounds.....	31.0	122.0

This ratio equals 3.94, secured by dividing 122 by 31, which ratio is about right, and plenty near enough for our purpose.

Go ahead with the mixture as determined, feeding with every 100 pounds of corn 50 pounds wheat flour middlings and 20 pounds meatmeal tankage. These can be all mixed together, or the wheat middlings and tankage might be mixed together, and fed as a slop, and the corn fed dry separately, or each one may be fed separately, or any other good way as the main point is for the pigs to glean all without waste.

Why Limit These Feeds?—The question might immediately arise, "Why not let growing and fattening pigs have free access to all of these feeds?" That does work finely, in truth splendidly, in ordinary times, but if one could buy his wheat flour middlings relatively cheap, he would be at a disadvantage under a system of this sort because the pigs would eat very little of the middlings, or with every 20 pounds of tankage they would probably eat only about 20 pounds of middlings or maybe a little more, depending upon conditions; so that to utilize the cheaper middlings, mixtures will have to be resorted to. In other words, one gets into difficulty by attempting to feed certain ratios and depending on the allowance singly of feeds to do it, because the pigs naturally have ideas of their own in regard to the matter of consumption.

In closing this dissertation on building the ration we must again emphasize and re-emphasize that we should have one or more of the following named feeds in American rations for growing, pregnant, suckling or breeding swine:

Basic Ingredients.—A. Some kind of milk (skim, butter or whole). The buttermilk powder or semi-solid buttermilk will fill the physiological bill as well as ordinary natural milk products excepting, of course, that less will be required. But do not forget to figure the economy of the feed on the assumption that a pound each of dry matter in skimmilk, buttermilk, buttermilk powder and semi-solid buttermilk powder is about equally valuable.

B. The green, tender leafy pastures of alfalfa, red clover, sweet clover, other clovers, rape, bluegrass, rye, wheat, barley, and possibly soy-beans, cowpeas and peanuts for all classes. Alfalfa or clover hay, particularly for the brood sow or maintenance hogs but not particularly so for young growing animals because too

much fibre is contained therein. The leafy portions are all right, however.

C. Meat and fish products, such as meatmeal tankage, or fish-meal.

These are the feeds that contain the vitamins, the mineral elements, and the right kind of proteins ordinarily required to balance the grain ration; hence the reason why one or more of these feeds should be included in all of ordinary swine feeding operations. They assist greatly in insuring thrift and vigor and greatest of all, they insure larger satisfaction, which insurance is quite essential.

CHAPTER II

FORAGE CROPS THAT MAKE GOOD

Successful and most economical swine husbandry centers to a large extent round the corn and barley crops in America, but it also is determined to a considerable degree by the kind and character of forage crops, and the methods of using them; inasmuch as these forage crops are used to supplement corn, barley and similar grains, being of great assistance in lessening the bill for meatmeal tankage, which costs over \$100 a ton, and linseed oilmeal at the war price of around \$60 and \$65. In other words, the better forage crops, rightly selected, replace these high-priced supplementary concentrates, giving the swinegrower an opportunity to produce the equivalent of these high-priced feeds on his own farm, and in such a manner that they will be harvested by the swine, so that much labor will be saved.

Why Grow Forage Crops?—We grow forage crops because they replace high-priced concentrates. We grow them because they are part of an efficient system of swine production. They afford range which, of course, insures that the growing pigs and the brood sows get considerable exercise, and getting exercise, are healthier. Forage crops are good because they furnish a succulent feed, and thus, because of the succulence, promote digestive tone and well-being. Forage crops permit the hog to drop his manure right on the land, and thus increase fertility. Manure left in the hogyards is often largely wasted; thus indirectly forage crops add to the direct benefits of forage farming. Forage crops, if rightly selected, enrich the land in nitrogen, through alfalfa, clovers, beans, peas and others, which have the power of taking nitrogen from the air. Forage crops insure that at least a part of the ration be self-fed, generally speaking, particularly so if the pigs are allowed free access to these crops. Forage crops help out on the rotation, promote greater industry and resourcefulness in swine raising and directly and indirectly encourage good general farming as well as good swine raising.

The Rank of Forage Crops.—Our greatest forages for the cornbelt rank about in this order: Alfalfa, first; Dwarf Essex rape and medium red clover (and possibly also Mammoth red clover, alsike clover and other clovers, depending on the locality where grown and how grown) second and third; bluegrass (particularly when in the green growing stage and not when dry, hard and brown), fourth; sweet clover (particularly of the first year's growth, when it is young, green, tender and rich in its particular constituents, namely, protein, minerals and vitamins that grains lack, and not the second year's growth, after it becomes hard and woody), fifth; and, lastly, there would come these forages: Rye,

wheat, soybeans and cowpeas. Generally speaking, then, from the standpoint of the cornbelt, we would place the pastures in the order of their merit, as follows: Alfalfa, rape, red clover, bluegrass, first-year sweet clover, and after that we would depend on the other crops mentioned.

Selecting Forage Crops.—In order to get an adequate idea as to how to select a forage crop, it is essential that we know just what should be the requirements of the ideal pasture and forage crop.

From the idealistic standpoint, therefore, the forage crop should be first and above all adaptable to the local soil and climate; it should be palatable, highly relished by the swine; it should give a heavy yield of highly digestible protein of good supplementary quality; it should furnish a considerable quantity of mineral elements of the right sort; it should furnish considerable of fat soluble A, this being essential to life and well-being; it should also carry fat soluble B, and the anti-scorbutics or scurvy specifics; it should also be low in crude fibre, because swine cannot handle much crude fibre to advantage; it should have a narrow nutritive ratio, that is, a large proportion of digestible protein in relation to the starchy or fat-forming materials; it should be somewhat succulent, although not excessively so; it should have a long pasturage season, coming early particularly, staying green during the hot, dry summer and remaining green and palatable late in the fall, even after heavy freezes come (better still if it can furnish green feed during the winter, like does rape sometimes but more particularly like does wheat); it should be able to endure trampling and ordinary grazing; it should be permanent, or at least maintain a stand for a reasonable number of years, like bluegrass or alfalfa; it should be seeded with relative ease; it should not cost too much to get a stand, nor take too long; it should be capable of furnishing good pasture at any time from April to December (rape is pretty good, in that it can be used as an emergency crop and is ready for pasturing a couple of months after seeding); and it should preferably be of a leguminous character; that is, it should have the ability of gathering nitrogen from the air and thus help in keeping up the fertility.

Unfortunately or fortunately, depending on the viewpoint, we have no single crop that will supply all of these essentials. We have certain crops that supply many of them and all of them are supplied in some one of the various crops. There is one crop that stands out above all others, however, in supplying the majority of these, and that crop is alfalfa.

Alfalfa Pasture.—Of all the crops that grow in the northern or in the southern or even in the eastern states of America, alfalfa from the swine-forage standpoint stands out as the peer of them all. Alfalfa is a heavy yielder of the kind of constituents that are needed to balance the ordinary corn ration. It balances the corn of the cornbelt, and the barley of the west, and the rye of the north.

It is entirely possible to raise pigs from birth to maturity, in truth, to go through the entire cycle of swine husbandry, with corn and alfalfa. Of course, this can be improved somewhat, but these two are the great basal feeds, from the standpoint of economical and physiological efficiency, and the man who wishes to make the most of swine husbandry will see to it that these crops be grown in his locality, if it is possible. Of course, there are certain sections where the corn may be displaced, and also the alfalfa, but, generally speaking, if they grow to advantage, they are the ones to use.

Of all the crops that we have used in our experimental work at the Iowa station, we have secured especially economic gains on two: alfalfa and Dwarf Essex rape. Both stand out particularly strong in balancing corn. We do not pass without of course saluting red clover.

Heavy Grazing Ill Advised.—Heavy pasturing of alfalfa is detrimental. We usually figure on pasturing the alfalfa only about one-third to one-half of what it will stand, and then take off the regular cuttings of hay therefrom. In other words, on pasture that will yield from 4 to 7 tons per acre, we will run from 10 to 20 weanling pigs from late May or early June to the 1st of November, and then take our regular hay cuttings off the field, making the cuttings when the young shoots begin to form at the crown of the plants.

Protein in Alfalfa.—Alfalfa runs high in protein. A dry-matter analysis (this refers to the alfalfa plant with all of the water squeezed out) showed that on about April 24 one year the leaves showed in every 100 pounds of this water-free material 38.8 percent of protein. This is higher than oilmeal, and more than twice as high as wheat middlings. Of course, the stems will run less than this but, generally speaking, pigs know enough to eat the "tenderer" portions. Note in passing that the reason why we make our regular cuttings is to stimulate new growth because it is the new growth which runs highest in protein and minerals and lowest in fibre—things that are essential. To show just how the more rapidly-growing parts of alfalfa analyze or namely, higher in protein and lower in fibre, we submit these figures:

An analysis of the top half of alfalfa on May 26 showed protein 31 percent and fibre 14 percent in the dry matter. The lower half of the same plants showed a little more than half as much protein, or 18 percent, and more than twice as much fibre, or 29 percent, and the pigs know somehow that the top half of the alfalfa is the best. In truth, if one watches pigs in the alfalfa field he will see them very often simply bite off the upper portion, because it is *tenderest* and most palatable, and because it supplies their nutritional needs to the greatest advantage. It would be flattering to the horse to say that these pigs exhibit "horse-sense," whereas they really show normal "hog-sense."

How much grain will an acre of alfalfa save?

In 1916 we fed six groups of pigs, 5 on alfalfa and 1 in drylot, as per the following tabulated presentation:

The Self-Fed "Free-Choice" Pigs on Alfalfa Pasture*

Animal Husbandry Section Results—Iowa Experiment Station—Growing and Fattening
2½ Months Old Pigs.
Initial weight 55 pounds—final weight 225 pounds—feeding period began July 6th—
all limited groups hand-fed twice daily.

Lot No.	Ration Fed	Days Required to Reach 225 Pounds Live Weight	Feed per 100 Pounds Gain			Pasture, Acres
			Shelled Corn, Pounds	Tankage, Pounds	Total, Pounds	
I	Alfalfa. Shelled corn 2% plus meatmeal tankage hand-fed twice, July 6 P. M., to Dec. 27 A. M.	174.5	362.6	40.4	403.0	.027
II	Alfalfa. Shelled corn 3% plus meatmeal tankage hand-fed twice; July 6 P. M. to Nov. 30 P. M.	147.5	353.4	35.4	388.8	.026
III	Alfalfa. Shelled corn to limit of appetite plus meatmeal tankage hand-fed twice; July 6 P. M. to Nov. 14 P. M.	131.5	368.4	33.4	401.8	.022
IV	Alfalfa. Shelled corn to limit of appetite plus meatmeal tankage hand-fed thrice; July 6 P. M. to Nov. 13 A. M.	130	355.4	33.1	388.5	.023
V	Alfalfa. Shelled corn self-fed plus meatmeal tankage self-fed; July 6 P. M. to Nov. 4 A. M. .	121	342.7	31.7	374.4	.018
VI	Dry lot. Shelled corn self-fed plus meatmeal tankage self-fed; July 6 P. M. to Nov. 13 A. M. .	130	354.2	50.6	404.8	None

*Work done by Evvard and Dunn.

Note particularly that alfalfa saved considerable tankage or, instead of taking 50.6 pounds, as it did in drylot for each 100 pounds of gain, it took only 31.65 pounds where alfalfa was used; thus saving practically 19 pounds of tankage on each 100 pounds of gain made, by simply allowing the pigs access to alfalfa, as compared to keeping them in a drylot, this being where ample corn and meatmeal tankage are self-fed in separate feeders, "free-choice" style. Note also that less corn was required,—practically 12 pounds less on each 100 pounds of gain.

Feed Saved By Using Alfalfa.—In figuring this on the basis of pasturage used, which amounted to .018 acres or 18/1000 or 9/500 of an acre for each 100 pounds of gain (the acreage charge was determined by dividing the area by the number of 100 pounds of gain that they put on), we find that the acre of alfalfa saved, in round numbers, 639 pounds of corn plus 1050 pounds of meatmeal tankage. Crediting the corn at \$1.50 a bushel and the tankage at \$100.00 a ton, the alfalfa replaced \$69.63 worth of these high-priced feeds. This is a splendid showing, and demonstrates what alfalfa

will do under good conditions. This also means that where you self-feed pigs according to the free-choice style with shelled corn and meatmeal tankage on alfalfa pasture, with pasture such as this used (which yielded better than five tons) there would be enough pasture to produce 5,555 pounds of hog gain. Do not misunderstand this. The acre of pasture plus whatever corn is necessary, and also tankage, will produce this amount of gain—not the pasture alone. In addition to pasture, there must be fed, according to these results, 342.7 pounds of corn and 31.7 pounds of meatmeal tankage for each 100 pounds of gain, in taking the pig from weaning time up to 225 pounds.

Note still further that pasture was not saved by limiting the corn ration. Note also that it was lost by limiting the ration. The pigs went to market earlier and had better markets when they were pushed hard from spring to fall. Stick to alfalfa if you can grow it. It is a great forage crop.

Rape.—How about rape pasture? Rape is a good second to alfalfa. It is a wonderfully good crop. We find in our work that we can carry on rape pasture anywhere from 15 to 30 pigs to the acre, depending on how they are handled. This is on land that yields a little more than 50 bushels of corn, on the average. Dwarf Essex rape of either the European or Japanese varieties is splendid. It can be drilled, broadcasted, or put in rows. We prefer drilling. It can be put in early in April (central Iowa conditions) and be ready for pasture about July 1 or sooner. It does well in certain sections of the south, and is a superior crop in Canada. In the south it is used as a winter crop. It is what one might call a cool-weather plant.

One could get along in the summer without any supplementary feed, if he had corn or barley, with rape pasture. It is ordinarily advisable to feed some tankage or milk or similar feeds in addition, also salt, but the point is that rape balances corn and barley to pretty good advantage.

Analysis of Rape.—A recent analysis at the Iowa station shows in the leaves of rape dry matter 29 percent protein and 8 percent fibre. This compares favorably with alfalfa; in truth, it runs higher than alfalfa on the average. The leaf stems analyzed 14 percent protein and 19 percent fibre. This shows a little less of protein but more of fibre than the leaves. The main stems analyzed 12 percent protein and 41 percent fibre. This shows them undesirable and explains the reason why pigs do not eat the stems; it also shows why they prefer the leaves, which run higher in proteins and much less in fibre. The leaves often run as high as three times as much in protein as the stems, and yet contain only one-fifth as much fibre. The roots run 7 percent protein and 52 percent fibre; hence it is seldom that pigs root up the roots of rape because there is little feeding value to be found therein.

An analysis of rape on May 3, edible portion (and this was when the rape was nice and young and tender, suitable for very young suckling pigs that are allowed to slip through the fence into the pasture away from their mothers) showed protein in the dry matter 36.9 percent. Again we see that rape is an excellent supplement to corn on the basis of its analysis. Years ago folks used to look on rape as a carbohydrate feed, but the pigs did not. We watched the pigs, and saw that their analysis did not agree with chemists' analyses. In other words, the pigs did better on rape than one would expect, judging from the published analyses of this plant. We therefore made some analyses, and found that the pigs were right, and that the chemists had misled us. Not that the chemists had made a mistake, but that the literature did not show definitely what their samples represented, and we were led to believe that the low-protein analysis shown for rape represented that which animals eat. But to make sure, our samples were taken of just those portions which the pigs ate. We watched the pigs as they ate rape and sampled accordingly—and lo and behold! the pigs were right.

How much corn shall we feed on rape pasture and how shall we feed it? Shall we limit the corn or give them considerable of it? Some results follow:

Animal Husbandry Results—Iowa Experiment Station.* Growing and fattening 2½ months old pigs, having an initial weight of 55 pounds and carrying them to a final weight of 225 pounds. Feeding period began July 6th, and carried on pasture November 13th, close of green season, after which all groups not yet reaching 225 pounds average weight were self-fed free-choice style or shelled corn plus tankage. Tankage allowance was identical per pig in all groups to the close of the forage season, hence only difference was in corn allowed.

Lot No.	Ration Fed	Days Required to Reach 225 Pounds Live Weight	Feed per 100 Pounds Shelled Corn, Pounds	Tankage, Pounds	Total Feed Corn Tankage	Acres, Rape
I	Rape. Shelled corn 2% or one-half full ration plus meatmeal tankage hand-fed twice daily..	172	363.5	30.3	393.8	.038
II	Rape. Shelled corn 3% or two-thirds full ration plus meatmeal tankage hand-fed twice daily..	145	335.2	25.8	361.0	.035
III	Rape. Shelled corn to limit of appetite plus meatmeal tankage hand-fed twice daily.....	134	374.7	24.2	398.9	.032
IV	Rape. Shelled corn self-fed plus meatmeal tankage self-fed "Free-Choice" style.....	122	342.5	22.4	364.9	.032

*Work done by Evvard and Dunn.

In the above test the self-fed group and all the hand-fed groups were fed as much tankage as the self-fed lot IV required, so that the meatmeal tankage allowance was identical per pig in all groups to the close of the forage season, hence the only difference was in corn allowed. On the basis of the above figures, it is found that the self-feeding of corn and tankage on rape saved time, saved high priced tankage feed, generally speaking, and saved pasture. The grain saved by the acre of rape pasture equals, if contrasted

with drylot fed pigs, self-fed corn and tankage alongside, 366 pounds of corn plus 881 pounds of tankage, which, valued at \$1.50 a bushel and \$100 a ton, is equivalent to a saving of \$53.86 worth of high-priced feed saved by an acre of rape.

Try rape and you will like it. To grow it once means to keep on growing it, because it does well, saves high-priced feed and stays green during the entire growing season furnishing succulent feed for the swine herd, particularly in July and August, when other pasture crops are inclined to dry up.

Medium Red Clover.—It is hardly necessary to go into detail in regard to the practicability of medium red clover as a forage crop for swine, because it is so widely known and so favorably received wherever grown to advantage that most men understand its efficiency. Medium red clover, unless quite young and tender, does not, however, analyze so well as alfalfa or rape, but it does contain a large proportion of those ordinary constituents which go to balance the ordinary grain ration—such as protein, mineral elements and vitamins. It is possible to get along fairly well on good clover pasture without any high-priced supplement, but it is not so easy to do this as on rape or alfalfa.

Red clover fits into the ration finely, and will continue to be used. It is difficult in some localities to get a stand, although in certain sections, as central Indiana, it seems to be easy to catch a seeding. It does not withstand drouth so well as alfalfa or rape or even sweet clover, and, as a result, in July and August, and particularly in the latter part of August, it becomes dry and hard. Rains are necessary about this time in order to stimulate second growth, and if rains do not come we have hard, brown clover which is unpalatable, and is not eaten by the pigs, and hence, of course, they lose its balancing effects. When clover blooms nicely pigs are particularly fond of the blossoms, inasmuch as they have a sweet taste that apparently is relished.

One of the Best Swine Pastures.—One can make no mistake in depending on red clover in the regular rotation, inasmuch as it is one of our three best swine pastures. In its place we can depend on alsike clover which, if it yields about the same, will give similar results. Mammoth clover is excellent, and will do about the same as medium red clover. White clover is fine, but in the great middle west sections it really is a supplementary crop—supplementary to bluegrass, and helps make bluegrass more efficient in the early season. When one grows pasture crops, such as red clover or alfalfa, he can always cut them for hay, in case the pigs do not materialize just right or in case they are switched over to some other crop. With rape, however, it is essential that it be pastured, because it cannot be cured in the ordinary hay-making way to advantage.

Swinemen everywhere may lay emphasis on red clover and depend on it as the mainstay in their forage crop regime, more especially where it does well, and where stands can be easily secured, and where the rotation adopted is such as to devolve it to its full extent as a necessary factor in the managerial plan of the farm.

Bluegrass.—Bluegrass is the standard pasture grass of a considerable portion of the United States. It has been abused, however, on many an occasion, and some novices have thought it almost worthless as a swine pasture. While it is true that bluegrass is a most disappointing pasture in July and August, when it browns up and becomes dry and hard, yet it more than makes up for this deficiency in the early spring, when it comes shooting forth in all its tenderness and greenness; any time in April and May it is a fine pasture grass. Then again in the fall, following late rains in August and September, it comes forth, sending up new shoots, which pigs take advantage of, and which the chemists' analysis and the pigs' inclinations show to be well adapted to the balancing of the corn ration.

Analysis of Bluegrass.—To emphasize the value of young, tender bluegrass that comes early in April, a sample gathered on the 12th of that month with the young tender shoots, showed in the dry matter 41.29 percent protein, with a crude fibre content of 13.22 percent. This is a good showing for young, tender bluegrass. We have found that with such bluegrass pigs do approximately as well as they do on alfalfa, but, unfortunately, this kind of bluegrass lasts only a few weeks, and then it begins to get worse and worse, running high in fibre, and low in protein, low in fat, and also low in calcium and phosphorus, the two elements that go to make up the bone.

Contrast this excellent April analysis of 41 percent protein and 13 percent fibre in the dry matter with an analysis of the same bluegrass a little later in the season, namely on June 24. At that time we found that the protein content was about one-fifth of what it was formerly, or 8.7 percent, and the fibre had more than doubled, analyzing 30.04 percent, and the calcium had dropped down so that about one-fifth as much was present as earlier in the season or instead of $\frac{1}{2}$ of a pound in 100 pounds of dry matter it ran to less than $\frac{1}{10}$. Let us not forget that calcium forms some 40 percent of the dry ash of bone, and is of the utmost importance in balancing the grain ration, because the grains are low in this bone-building and stimulating material. Phosphorus also shows a big decrease, being about $\frac{1}{30}$ as much in June as in April per 100 pounds of dry matter of bluegrass.

But as a fine, compact sod bluegrass deserves special credit, and it is a fine place to carry young litters, putting the sows out so that they can get sunshine and green feed. Coming early as it does, it ranks alongside of winter rye, winter wheat and sweet clover (the earliest of spring pastures) and, being a compact sod, it can be pas-

tured the earliest because it stands trampling especially well. Let us take advantage of bluegrass while it is green and tender, getting out on it early and staying late but depending during late May, June, July, August and part of September for the major part on other forages, such as alfalfa, rape, red clover and others. Much depends on the season, however, as to just how bluegrass does. Generally speaking, when it becomes hard and woody, have other pastures ready, or else see to it that the pigs' corn or barley or other grain ration is in large measure made up of skimmilk or tankage or similar good feeds.

Sweet Clover.—The first year's growth of sweet clover makes a fairly acceptable hog pasture, and some tests at the Iowa station have shown it to be as valuable as red clover. The first year's growth of sweet clover has a big advantage, in that it stays green throughout the season, but it has the decided disadvantage that it is difficult to procure a stand acceptable for pasturing the first year of its growth. Seeded with a nurse crop, it is available after the crop is removed, which will be along in July. Seeded alone, it is difficult to get a stand, although it is possible, and we have done it. This means that most of the sweet clover pasturing is done late in the first year's growth, or during the second year, in which year, the last of its growth, it tends to blossom early, and thereafter quickly becomes woody and worthless as a pasture ordinarily before the middle of the summer has come. Of course, the second year's growth can be much improved by frequent clippings, but these must be made high, 6 to 10 inches, else one will kill out the sweet clover. But bear in mind that sweet clover can be used as a hog pasture to advantage; hogs will eat it; and, being a legume, it adds fertility to the land. Sweet clover in rapid stages of early growth runs high in protein and mineral elements and vitamins, all of which are good for pigs.

Sweet clover has a bitter principle called cumarin, which gives it its bitter taste, but in spite of this pigs will eat it, as will cattle and horses. It is well to give sweet clover the credit it deserves, but to use it only when one cannot secure good stands of alfalfa, rape, medium red clover. After all, local competition on the home farm will determine its place.

Our advice is that you put your faith in alfalfa, red clover, rape and bluegrass; these crops supplemented with winter rye and winter wheat as early and late pastures—and doing that you cannot go far wrong in the cornbelt.

Miscellaneous Pastures.—There are other pastures besides those mentioned which may be used, such as green rye, for instance, which, seeded in the fall, makes good late pasture and is ready for early pasturing in the spring. It runs very high in protein. Young, tender plants showing as much as 25 pounds of this material in 100 pounds of the dry matter are a valuable supplement to corn, barley, wheat or rye. One must remember, however,

to take pigs out when they begin "spitting out the cud," which is about the time the rye begins to joint. To stay in longer is to decrease the grain yield, and to depend on a pasture that is getting steadily poorer and poorer in its farm grain-balancing characteristics. Keep your eye out for the cuds of rough cellulose, "asbestos-like" material and then when found transfer the pigs to other pastures.

Effects of Green Rye.—In some years green rye pasture is quite a laxative. If much trouble is experienced in this respect, some bloodmeal at the rate of 1/10 to 1/5 of a pound per pig daily may help some, but if that does not remedy it, then transfer them to other pastures for a time, or else alternate other pastures with the rye.

Winter wheat is a splendid pasture when young and tender in the late fall and early spring. We have thought it a better pasture, so far as pigs are concerned, than rye. It will not carry so many pigs as rye pasture, but they will do better on it, and make a little more rapid gains with a little less feed outlay. We are inclined in certain seasons, under certain conditions, to favor wheat over rye. It cannot stand the pasturing, however, and must be handled more delicately.

Common field oats can be pastured when quite young, but oats pasture is not nearly so good as rye or wheat. Sorghum is depended on by some, but it is a poor pasture for swine. It does not contain the constituents that are necessary. It is too rough and fibrous and unpalatable. It makes a better shade and wind-break than a pasture.

Soybeans are sometimes promoted and pushed as a banner swine forage crop in the great middle west. They are dependable in the southland and in the southern sections of the cornbelt, but when one tries to grow soybeans in the northern portions of Illinois, Iowa and sections of similar latitude, he finds trouble in getting beans that will mature. At Ames we have not been particularly successful with soybean pasture for swine. In fact, we have been relatively unsuccessful. We have tried them out on quite a large scale but years ago found difficulty in maturing them. We are continuing our investigations, however, and trust that the future will show them up more favorably. We have varieties developed now that ripen nicely in safe season.

In our past experience rape, alfalfa, young, tender bluegrass and green, growing sweet and red clover have all greatly excelled soybeans, the pigs doing better on these crops, gaining faster, and requiring less feed for 100 pounds of gain. We believe, however, that soybeans can be used in the cornfield to good advantage but even in the northern sections of the cornbelt if rape can be used, so much the better.

Cowpeas are similar to soybeans but they are adapted to an even more southerly climate than soybeans; therefore, in Iowa, soybeans clearly excel them. In the south they come into their own and can be used to advantage in some sections.

Certain mixtures are sometimes used, like oats, Canadian peas, and rape. This is all right, but commonly the biggest portion of the pasture is furnished by the rape. Further north than Ames field peas can be used to better advantage; where they will yield 20 or 25 bushels to the acre, as they do in Wisconsin, for instance; field peas make an excellent forage crop, particularly for hogging-down after the grain has practically matured. In certain sections of Colorado they can also be used to especially good advantage.

We have tried a mixture of oats, hairy vetch and rape, but the pigs did not like the vetch. They would go under it and over it; they used it as a bed and as a cover, but they fought quite shy of using it as a feed. Our advice, therefore, in regard to vetch is to steer clear of it as a pig pasture. Of course, this does not mean that it should not be used for its soil-renovating qualities.

Bear in mind continuously the great advantages of pastures in the saving of high-priced supplements. Grow them, placing special emphasis on their replacement of meatmeal, tankage, milk, and oilmeal and similar feeds. They will also save some corn, barley and corresponding grain feeds. While they will save some of these basal concentrates, yet their chief function is in balancing these feeds. Remember that the pig is an animal so constituted by his anatomy and inheritance that he is adapted to the conversion of concentrates into meat. Primarily he is not a roughage-eating animal and, generally speaking, when we limit the corn ration on good pastures, poor ones more particularly, we do not save grain (corn plus tankage) because it will take the pigs more days to reach a certain weight and, as a result, therefore, the feed required for 100 pounds of gain usually is greater than if the pigs were pushed hard from start to finish. Old sows or maintenance hogs of any sort can be turned out on good grass to good advantage, but even then a little grain added to the pasture is a splendid help.

In closing this dissertation on pastures it is well to emphasize the amount of protein supplement necessary for different classes of swine. The following scheme for feeding corn and tankage on high and low-protein pastures is adapted from Circular 26, written by Evvard and Pew of the Iowa Experiment Station:

On High-Protein Pastures

Alfalfa; rape, Dwarf Essex; red, mammoth, alsike, and white clover; young, tender, sweet clover; entire first year's growth and earliest stages of second year; quite early, tender, new coming timothy, rye, or wheat; and short, "shooting," tender, green, succulent bluegrass.

I. FATTENING AND GROWING HOGS FOR MARKET.

1. Suckling Pigs—5 to 40 pounds—Creep.

- (A) Corn, self-fed, tankage, self-fed, salt.

It pays to give the suckling pigs a good start. However, on good alfalfa, or clover pasture they will eat much less tankage than on drylot.

2. Weanling Pigs—30 to 100 pounds.

- (A) Corn, 10 to 5 parts, tankage, 10 to 5 parts, salt.

- (B) Corn, self-fed, tankage, self-fed, salt.

When pigs are self-fed on luscious, young alfalfa they eat about 94 to 96 corn and 6 to 4 tankage in going from weaning to 100 pounds weight.

3. Shotes—100 to 175 pounds.

- (A) Corn, self or hand-fed, salt.

- (B) Corn, self-fed, tankage, self-fed, salt.

On good, high-protein alfalfa such pigs will eat about 96 to 98 corn and 4 to 2 tankage.

4. Hogs—175 to 250 pounds.

- (A) Corn, hand or self-fed, salt.

5. Fat Hogs—250 to 300 pounds.

- (A) Corn, hand or self-fed, salt.

II. FATTENING SOWS FOR MARKET.

1. Sows, Fattening off—All Ages.

- (A) Corn, hand or self-fed, salt.

If in poor condition and not doing well, feed same tankage or skimmilk or buttermilk until they get nicely started; the gilts will need somewhat more than older sows.

III. STAGS, FATTENING FOR MARKET.

- (A) Corn, hand or self-fed, salt.

IV. CARRYING SOWS, BREEDING (PREGNANT).

1. At Breeding Time and During Gestation.

- (A) Corn with an addition of 5 to 10 per cent tankage until the sows are bred. Then put the sows on corn until about a month before farrowing time comes, when a limited amount of tankage or separated milk may be fed to them so as to encourage milk secretion. This method of feeding will also insure that there will be good strong, lusty, active, new-born pigs.

V. *CARRYING SOWS, SUMMERING—TO BE BRED IN THE FALL.*

1. Fall Gilts and Yearling Sows.

- (A) Corn, limited ration, regulate according to gains and conditions desired. Change ration to corn and tankage ten days before breeding the sows to encourage liberation and fertilization of many ova, in order to increase the number in the litter at farrowing time.

On Low-Protein Pastures

Dry, hard, fibrous bluegrass; sorghum; feterita; millet; timothy when over 4 inches high; rye or wheat over 8 inches; or oats and barley over 5 inches, or beginning a couple of weeks before starting to joint; and sweet clover of second year's growth after ten inches high. One must feed practically the same as in drylot. These pastures will, of course, save some grain feed, but they are not high enough or well balanced enough in the substances, such as protein, minerals, and essential feed accessories that balance the corn to permit the lessening of the proportion of supplement used as compared to drylot. Our drylot recommendations follow:

Successful Rations for Economical Dry-Lot Feeding

I. *FATTENING AND GROWING HOGS FOR MARKET.*

1. Suckling Pigs—5 to 40 pounds (fed in creep).

- (A) Corn 80 parts, tankage 20 parts, salt.
(B) Corn self-fed, tankage self-fed, salt.

2. Weanling Pigs—30 to 100 pounds.

- (A) Corn 80 to 85, tankage 20 to 15, salt.
(B) Corn self-fed, tankage self-fed, salt.

3. Shotes—100 to 175 pounds.

- (A) Corn 85 to 90, tankage 15 to 10, salt.
(B) Corn self-fed, tankage self-fed, salt.

4. Hogs—175 to 250 pounds.

- (A) Corn 92 to 96, tankage 8 to 4, salt.
(B) Corn self-fed, tankage self-fed, salt.

5. Fat Hogs—175 to 250 pounds.

- (A) Corn 95 to 99, tankage 5 to 1.
(B) Corn self-fed, tankage self-fed, salt and charcoal.

II. FATTENING SOWS FOR MARKET.

1. Yearling Sows (Gilts) After Weaning, "Fattening off."

(A) In Poor Condition, and "Run Down."

1. Corn 90, tankage 10, salt and charcoal.
2. Corn self-fed, tankage self-fed, salt and charcoal.
Omit tankage last two or three weeks.

(B) In Good Condition—Thrifty.

1. Corn 92 to 95, tankage 8 to 5, salt and charcoal.
2. Corn self-fed, tankage self-fed, salt.
Omit tankage last two or three weeks.

2. Two-year Old or Older Sows After Weaning, "Fattening off."

(A) In Poor Condition, and "Run Down."

1. Corn 95, tankage 5, salt.
2. Corn self-fed, tankage self-fed, salt.
Omit tankage last few weeks.

(B) In Good Condition—Thrifty.

1. Corn all will eat, preferably self-fed, salt.

III. FATTENING STAGS FOR MARKET.

Stags may be fed about same as sows.

IV. BREEDING SOWS, CARRYING (PREGNANT).

1. At Breeding Time—Flushing to Increase the Number in Litter.

Start 10 days before breeding.

(A) Gilts.

1. Corn self-fed, tankage self-fed, salt.
(For a few weeks until bred.)
2. Corn 88, tankage 12, salt.

(B) Older Sows.

1. Corn self-fed, tankage self-fed, salt.
(For a few weeks until bred.)
2. Corn 90, tankage 10, salt.

2. During Gestation or Pregnancy.

(A) Gilts: Should gain about .6 to 1 pound daily.

(B) Sows—Yearling Sows or Older: Should gain .5 to 1 pound daily.

1. Practically same as for gilts, excepting slightly more corn may be fed, and somewhat less supplement.

V. SUCKLING SOWS.

1. Gilts and Older Sows.

(A) Corn self-fed and tankage self-fed, salt.

(B) Corn dry or soaked as sows and pigs wish in addition to from 15 to 25 pounds of meatmeal tankage with every 100 pounds of corn, salt.

Notes

1. To substitute the tankage allowance (as given) with oilmeal, use about 2 to $2\frac{1}{2}$ times as much, as, for instance, instead of using corn 90, tankage 10, use corn 90, linseed oilmeal 20 to 25. However, oilmeal as the lone supplement to corn is not advisable unless the pigs be on good pasture, and even here milk, middlings or tankage are in order. If skim or buttermilk is substituted for the tankage use 20 times as much, or with middlings, 17 times as much with equivalent or equal corn amounts.

2. Barley, rye, wheat, speltz, Kafir corn, Milo-maize, sorghum seed (all to be ground) and comparable feeds are quite similar to corn, and may be substituted for part or all of the corn in the rations given, provided they are abundant and cheap enough. Rye is sometimes likely to cause digestive troubles if fed in large quantities but that is dependent on the local conditions. Barley is a most efficient substitute for corn and when properly supplemented produces a most excellent quality of pork, but its great drawback in the corn country is its relative high price. None of these feeds mentioned are the economic equal of corn when it comes to producing pork for profit in the cornbelt.

3. Common salt should always be fed to hogs, allowing it free-will after they are accustomed to it. Our experimental findings are indicating the truth of this suggestion.

CHAPTER III

PRINCIPAL SWINE FEEDS AND THEIR USE

To obtain a fairly adequate idea as to the merits and uses of different feeds employed in the practical production of pork, it is well to take up each feed separately, and discuss it from many feed angles—angles that determine the feed's field of usefulness in swine husbandry. The points to cover are practical economy in the feeds used; particular outstanding qualities; shortcomings and how remedied; palatability; adaptability; effect on health; influence on production of pork products; methods of preparation necessary; relative value as compared to other feeds; general distribution and appreciation accorded; and general as well as specific information as to how to use the feed to the best advantage in rations. With these points in mind, we shall begin with the first feed—corn or Indian maize grain.

Corn or Indian Maize Grain.—Our most efficient basal swine feed is corn. Corn grain is widely and extensively used in successful practice. Corn is highly relished, being a great favorite among feeds when pigs are given a chance to eat to suit themselves, being preferred to barley, oats, rye, wheat and similar feeds so far as quantity consumed is a measure of that favoritism. Corn is highly concentrated, hence often abused in its use. Why? Because of its low content of fibre and the high value of the feeding materials present, other than fibre, it is a great fattening feed, and as a result breeding stock may often become too fat on it; further, because hogs like it so well that swinemen are apt to use it to the limit, and in many cases the trouble is too much corn as well as too little of some of the essential feeds necessary to balance corn. There is nothing the matter with corn in these cases, excepting that it is not handled right. One can abuse almost any kind of feed by using it wrongly. Even such a good feed as milk can be made to appear relatively inefficient if it is not used judiciously and carefully.

Corn a Healthful Feed.—Corn is a very healthful feed and so far as we know does not contain any toxic products as does cottonseed meal, or linseed oilmeal sometimes, or the embryos, germs of wheat (found largely in wheat middlings and wheat bran). Corn produces a good product, pork made from it being sweet and quite firm and of good character, presenting a good appearance. Lard from corn-fed hogs is especially good, because of its whiteness, firmness and general appearance. But corn has its shortcomings. "Corn-alone" feeding is a bad procedure. What is the matter with corn? Corn lacks in quantity and quality of protein for practically all classes of swine excepting, possibly, for the short finishing of hogs that have attained most of their growth and are

in a good, healthy condition at the beginning of the finishing period—such hogs, for instance, as brood sows that have weaned their last litters, or heavy, fairly mature 200- to 300-pound animals that are ready for a one- to two-month finishing period, or old boars that have been castrated, and are ready for fattening, to be marketed as fat stags. Young animals require to have corn balanced, and these feeds are most acceptable: Milk of whatever kind (whole, skim or butter), meatmeal tankage, alfalfa and red clover pastures, rape forage and many others.

Corn and Alfalfa.—Corn and alfalfa pasture is our greatest summer combination, both economically and physiologically speaking. It is the real basis on which to build for greater swine profits throughout practically all the United States, but more especially in those localities where hogs are fed directly on the products of the soil. Of course corn and alfalfa can often be improved somewhat by the addition of a little milk or tankage or corn oil cake-meal or similar feeds. These two feeds, however, form the bulwark and foundation of the ration, the corn furnishing the fattening and energy materials in general, which materials constitute in reality the bulk of the ration, and the alfalfa making up its (corn's) deficiencies in protein, mineral elements and vitamins. Corn and rape is another good combination. Corn and red clover is still another. In sections where rape and red clover do well, they both run a close second to alfalfa as a general corn-balancing swine pasture.

Corn lacks not only in quantity and quality of protein but also in mineral elements; the method of procedure is to supply these proteins and minerals of the right sort. Generally speaking, in our present stage of knowledge the remedy is to supply these good quality proteins and minerals through the use of feeds that contain them in the largest quantity, such high-protein feeds, for instance, as alfalfa pasture or alfalfa hay (for broodsows particularly), red clover pasture, rape forage, meatmeal tankage and most acceptably of all any of the milks. These are rich indeed in needed mineral elements, and are splendid because of this. In addition, however, it is well to supply certain standard minerals, letting pigs have them free-choice style, putting each of them in separate containers, so that pigs can run thereto whenever they will. These minerals may be mentioned and emphasized.

Limestone.—This should preferably be finely ground. The ordinary chalk found in the Dover cliffs of England is really a pure limestone, being, chemically speaking, practically entirely a calcium carbonate. Generally, we prefer a calcium rather than a magnesium limestone, although we are a little inclined to believe that a good calcium limestone with a small content of magnesium is satisfactory. Limestone furnishes particularly the calcium which makes up some 40 percent of the dry ash of bone. A growing pig cannot eat enough corn to supply the lime or calcium con-

tent necessary for his own bones' normal development; hence it must be supplied, and by feeding limestone in a separate feeder this need is taken care of. If limestone, which, by the way, is the cheapest form we know of, cannot be secured, then dependence can be placed on air-slacked lime, which is practically the same thing, only in a finer stage of division. This can be secured at almost any lumber yard. Pigs sometimes eat the cement from the foundations of buildings in order to get the necessary lime for their development. We well remember having a bunch of pigs that did this. They ate large holes into the foundation wall of a certain building next to which they were quartered.

In practice many prefer finely ground bone meal as the calcium source—in furnishing both calcium and phosphorus. The author is inclined to the same preference.

Rock Phosphate.—This should preferably be finely-ground, really powdered. Rock phosphate is supposed by some to be the remains of animals, and hence we find large quantities of calcium and phosphorus present, as in bone. These two chemical elements comprise the basal elements of bone, so much so, in fact, that when we speak of tri-calcium phosphate we instinctively think of bone. Rock phosphate will supply both the calcium and phosphorus, and there is not so much need for limestone when the rock phosphate is available. Remember, however, that limestone does not furnish phosphorus; hence even with limestone in the ration, phosphate is advisable. Bonemeal from the packing house is rich also in calcium and phosphorus and carries some protein and fat and may take the place of the rock phosphate, being more acceptable but somewhat more expensive relatively. It only takes a small percentage of the total feed as bone meal, usually not over 1, more likely less, hence a little greater expense in such a small item is hardly noticeable.

Wood Ashes.—Wood ashes contain three elements that are particularly advantageous—calcium, phosphorus and potassium. All are essential in the make-up of the animal body. About one-half of the wood ashes is calcium carbonate or a pure limestone. Wood ashes have been widely used for years and years by successful hogmen, and the practice of using them is good and sound.

Common Salt.—By all means supply common salt freely. Some folk have the idea that it should not be allowed, but nevertheless it should. Some experimental tests at Ames clearly have shown that common salt allowed at free-will is a valuable addition to the ration. It costs little, but it may yield a high return. To get an idea as to the results we have had in the feeding of salt, we present the results on some well-grown young swine of approximately 150 pounds average weight. These pigs received a basal ration of corn, linseed oilmeal, in the ratio of 6.1 pounds of corn to each pound of linseed oilmeal. Eight pigs were in a group, there being five groups in all. These groups were fed as follows:

Group 1. Corn plus linseed oilmeal, basal ration. Group 2. Same as Group 1, excepting the pigs got a little more than $\frac{3}{5}$ of an even ounce of salt daily per group, or about $\frac{1}{13}$ of an ounce per pig daily. This was mixed with the feed. Group 3. Same as Lot 2, excepting twice as much salt, practically $\frac{2}{13}$ of an ounce daily per pig. Group 4. Same as Group 2, excepting four times as much salt, practically $\frac{4}{13}$ of an ounce daily per pig. This is a little over $\frac{1}{3}$ ounce. Group 5. Same as Group 1, excepting that salt was allowed ad libitum, or free-choice style, being placed in a separate trough. This group of pigs consumed on the average practically an ounce of salt daily, or one-eighth of an ounce per head daily.

This experiment was run for a check period of 90 days before salt was fed, and during this 90-day period all groups were fed the same proportion of corn and linseed oilmeal; then after these 90 days were passed the groups were fed as stated with their different allowances of salt. As soon as salt was allowed we find that for 71 days following the first period, or for the 71 days during which they were on salt, for every 84.24 pounds gain made by Group 1, receiving no salt, Group 2 gained practically 10 pounds more or 94.02 pounds. This shows the advantage of a little salt. Group 3 gained more than 12 pounds more or 96.97 pounds, showing a still greater advantage from feeding salt in just a little greater quantity. Group 4 gained 94.13 pounds, which was not quite 10 pounds more, indicating that too much salt can be fed where it is mixed with the feeds. The most interesting development was that Group 5, receiving salt ad libitum, gained practically 13 pounds more on the same basis, or 97.23 pounds, showing quite clearly, so far as this test is concerned, that ad libitum or free-choice feeding is the best, so far as the gain is concerned.

It is easy to allow salt free-choice style. We do it by giving pigs free access to salt, using the rock salt preferably to prevent waste. We think there is no question that if pigs really need salt very badly they will be able to get it from the rock variety. We like very much the block salt, which is on the market, and prefer it to the rock, because it is not so hard and because pigs can get more of it in less time, and yet it is hard enough to prevent waste when it is under cover.

Let us now look to the feed requirement for 100 pounds of gain during the salt-feeding period of 71 days. For every 101.88 pounds of feed required to produce a unit gain, Lot 2 required 94.29 pounds; Lot 3, 91.56 pounds; Lot 4, 89.92 pounds and Lot 5, the best of all, only 89.36 pounds. Hence we see that all groups that received salt required less feed for 100 pounds of gain on this interpretation than did the no-salt group, and also that where the salt was allowed free-choice style the most creditable showing was made.

Let us bear in mind that too much common salt fed suddenly may cause trouble. Accustom pigs to it slowly, and do not throw in the troughs any brine in which salt pork has been, because in this case pigs, particularly if they have not been getting meatmeal tankage or similar feeds, will be so anxious because of the meat flavor of the salt brine to consume it that they may consume an extraordinary amount, and the salt in it may kill them. Primarily, we think, in these cases, because of the favorable meat flavor of the salt brine, they over-consume. But then, too, salt thrown out to the pigs even in its original form is apt to cause trouble, if they have been starved from it for a long time.

Sulphur.—This may be allowed. We are not sure of the efficiency of sulphur, but believe that powdered sulphur or Glauber's salts, which is really a sodium sulphate, can be allowed to pigs to good advantage. Perhaps both can be allowed but we are inclined to favor the Glauber's salts. We hope to have something more definite to offer on this later. These sulphur compounds are supposedly valuable because they furnish sulphur, which is an essential constituent of bodily protoplasm and which must be present in the ration somewhere, or else an animal cannot grow properly.

Charcoal or Slack Coal.—Just why charcoal, slack coal or partially burned cobs are fed—they all being of about the same character—is not exactly known. It is usually said that charcoal is fine because it absorbs alimentary gases, but no one has yet demonstrated that the gases should necessarily be absorbed in this manner. Anyhow, apparently, they offer some advantages. We believe that if these materials are supplied to pigs, and they eat of them, the chances are that they may do some good. We have found that pigs receiving corn alone are more likely to eat large quantities of charcoal or slack coal than those that have a properly balanced ration, made up of corn and meatmeal tankage, or corn and milk, and we have found that pigs that have been furnished with corn and meatmeal tankage free-choice style during the entire period of their lives in drylot eat very little charcoal in their earlier stages of development, when they are on a heavy tankage ration, consuming up to say $\frac{1}{3}$ to $\frac{2}{3}$ of a pound daily. But when pigs reach 300 pounds or thereabouts, and are living practically entirely on corn (maybe 1 percent would be meatmeal tankage), then they begin to eat charcoal, eating more in one day than in their whole previous lives, and not only one lot that we have experimented with but many have done this, thus indicating that there is a newly-developed need, after hogs come down to practically entirely corn.

Some day we may know more about mineral mixtures, but to-day we are in a transition state of knowledge concerning these mixtures, and so long as things are uncertain in regard to them we prefer not to give mixtures, but would emphasize the free-choice

style in the feeding of the materials mentioned. We believe, however, that some mixtures are quite acceptable, mixtures, for instance, such as bone meal 100 parts with common salt 50 parts, or wood ashes and salt, and some others.

Corn Lacks in Fat Soluble A.—This is secured in alfalfa, rape, red clover, meatmeal tankage, milk and so on. Green feeds help out wonderfully. Roots, such as carrots, are advantageous, because a pound of carrots contains as much as $\frac{1}{3}$ of a pound of this vitamine material of unknown chemical composition. In the main the shortcomings mentioned are the only ones that may be charged up against corn, but these are borne to a large degree also by barley, wheat, rye, sorghum grains, emmer and potatoes; hence when we learn to balance corn we learn to balance these other feeds, which are the main feeds of pork production. Practically all of these feeds mentioned as basal concentrates in pork production—barley, wheat, rye and so on—may therefore be balanced with the same supplements that balance corn. These supplements are milk, tankage, alfalfa, clover, rape and so on. Corn is splendid for pregnant sows, sucking pigs, boars, dry sows, maintenance hogs and others. With the brood sows, of course, one must be careful, because they are inclined to overfeed and that may interfere with the breeding regime, more especially of extreme lard-type hogs. However, a moderate amount of corn may always be fed with much psychological profit, particularly economical profit, in the heart of the cornbelt.

Preparing Corn for Hogs.—The question of the preparation of corn needs a little discussion. Of all of our basal grains, however, corn requires the least general all-around preparation. To get a comprehensive idea as to the necessity of soaking shelled corn, or grinding it into meal, or both grinding and soaking the grain, it is well to give a little experimental evidence to bring home to the swineman the fact that corn, generally speaking, does not need much preparation. At the outset, however, we emphasize that ear corn is the best all-around preparation, and that shelled corn runs it a close second. We speak of ear corn as being a preparation because the husks are removed. Some young pigs weighing 50 pounds at the beginning and 140 pounds at the finish of a 140-day feeding test had been run from weaning time in early summer to late in November on grass, being fed four different preparations—dry ear corn, soaked shelled corn, dry ground corn and soaked ground corn and they gave results as follows:

Preparation	Daily Grain Eaten per Pig	Average Daily Gain	Grain per 100 Pounds Gain
Dry ear.....	3.37	.74	456
Soaked shelled.....	3.24	.63	513
Dry ground corn.....	3.60	.61	595
Soaked ground corn.....	3.98	.72	555

Peculiarly enough, for these young, rapidly-growing weaning pigs, dry ear corn was the best preparation, and not only from the

standpoint of average daily gains made but also from the standpoint of least grain required for 100 pounds of gain. If the corn must be prepared rather than grind or grind it and soak it, it is better simply to shell it and soak it.

What will happen with pigs of a little larger weight? Some 100-pound shoters were fed 140 days from early spring to the middle of the summer. They had a final weight of about 290 pounds. Their ration was 92 percent corn grain and 8 percent meatmeal tankage, this being allowed in drylot. The following table shows that as pigs grow older they get greater relative benefit from the more elaborate preparations:

Preparation	Daily Grain Eaten per Pig	Average Daily Gain	Grain per 100 Pounds Gain
Dry ear.....	6.15	1.32	465
Soaked shelled.....	5.74	1.30	442
Dry ground corn.....	5.60	1.21	463
Soaked ground corn.....	6.75	1.52	445

But here again we notice that if the corn is to be prepared soaking is a fine way to prepare the shelled corn, although the results are close in all instances. One can study these figures and suit himself as to best methods of procedure.

Let us figure out what happens to still larger hogs—hogs weighing about 200 pounds at the start and fed 84 days to a final weight of about 360 pounds. The ration was corn grain 91 percent and meatmeal tankage 9 percent, fed in spring and summer dry yards. The table showing the results of four different corn preparations—the same preparations fed to younger swine above—follows:

Preparation	Daily Grain Eaten per Head	Average Daily Gain	Grain per 100 Pounds Gain
Dry ear.....	8.44	1.74	468
Soaked shelled.....	8.65	1.92	449
Dry ground corn.....	8.99	1.99	452
Soaked ground corn.....	9.22	2.00	461

Now we notice that as swine get older, and heavier, and more mature, the dry ear corn can be shelled and soaked to advantage, and, further, that soaking and shelling are as advantageous, generally speaking, as was the grinding or grinding and soaking.

What happens to still more mature hogs, such as old sows weighing about 200 pounds and fed to a final weight of 335 pounds, on the ratio of corn grain 93.3 percent and meatmeal tankage 6.7 percent in fall dry yards for 59 days? The answer follows:

Preparation	Daily Grain Eaten per Head	Average Daily Gain	Grain per 100 Pounds Gain
Dry ear.....	8.73	2.04	427
Soaked shelled.....	9.89	2.49	398
Dry ground corn.....	9.65	2.40	401
Soaked ground corn.....	9.87	2.44	405

Again the figures show that preparation for older hogs is in order, but that soaking shelled corn is equally if not more advantageous than grinding, or grinding and soaking.

From the results given, therefore, we may rightfully conclude that young pigs make relatively faster and more economical gains on dry ear corn than they do on soaked shelled corn, or dry ground corn, or soaked ground corn, and, furthermore, that as pigs grow older, and heavier, the corn that is prepared makes a little more rapid gains and requires a little less feed for 100 pounds of gain, but in any case, drawing broad conclusions, soaked shelled corn is to be generally preferred to dry ground corn or soaked ground corn.

Indiana Results.—A word as regards the results of Prof. F. G. King of Indiana along the same line. He fed swine of different weights and ages on three different corn preparations—ear corn, dry shelled corn and ground corn (just wet enough so it would not be thrown out of the troughs by the pigs while eating). In all instances the corn was balanced with a little wheat middlings or wheat middlings and tankage. As we study the figures we conclude without presenting them for consideration that shelled corn as compared to ear corn for young pigs is about equally good, not only as regards the gains made but the feed required for 100 pounds of gain. There is little difference in these two. The older swine above 100 pounds show that ear corn is apparently a little better feed, although the differences are relatively slight and within the limits of experimental error. Ground corn, as compared to ear corn, is just a little less efficient for real young pigs, although only slightly so; whereas for older swine ground corn comes into its own, becoming more and more efficient as the hogs get older and heavier, in that the gains are a little more rapid and the feed required for 100 pounds of gain is a little less. The results show a saving of some 17 pounds of feed for 100 pounds of gain where ground corn is fed as compared to ear corn for pigs weighing 140 to 220 pounds at the beginning of the feeding test. Roughly speaking, this would mean a saving of about 4 percent in feed, which is hardly sufficient to cover the cost of shelling, grinding and wetting when corn is low in price. When corn is high in price it may do so. But the point is that soaked shelled corn is as efficient as ground corn; hence why grind? Why waste time? Why wear out a feed grinder for this purpose?

Of course, if one has show stock, it is a case of doing anything reasonable to stimulate the appetite, and a little ground corn is useful in such a situation. We prefer usually to wet or soak the

feed that is ground in such cases. For sucking pigs we think a little soaked shelled corn effectual in getting them started, this being fed along with the dry. We also think that for suckling sows the soaking of some of the shelled or ground corn is advantageous.

Corn and Cobmeal.—Corn and cobmeal is a poor swine feed; for young growing pigs it is a delusion and a disappointment, being too fibrous and coarse. It actually requires more corn grain to produce 100 pounds of gain on young, growing pigs when such feed is fed than where dry ear corn as allowed or soaked shelled corn or any other ordinary preparation. Soaking the corn and cobmeal helps some, but even then it is unprofitable. About the only place the swine show that corn cobmeal can be used with any degree of satisfaction is with the brood sow that is being carried through the winter, but even in that case corn and cobmeal has little to recommend it as compared to ear corn or shelled corn. To illustrate the point, experimental evidence is submitted. We had four groups of yearling sows on four preparations. Lot 1 was fed ear corn; Lot 2, corn and cobmeal; Lot 3, shelled corn; and Lot 4, ground corn. They received in addition to 4 pounds of corn grain per head daily (the cob was thrown in extra, over and above grain in Lot 2) $\frac{1}{5}$ of a pound each of meatmeal tankage, linseed oilmeal and wheat middlings, together with as much salt as they wished at free-will. The results tell an interesting story. Inasmuch as the feed was kept the same in all groups, so far as the grain was concerned, the average daily gain per sow, comparatively speaking, tells a true tale. Lot 1 gained .65 pounds daily; Lot 2, .66; Lot 3, .67; and Lot 4, .61, showing clearly that ear corn was as good as the corn and cobmeal, or the shelled corn, but that ground corn was the poorest of all. We don't know just how to explain this, and hope to repeat the test, so far as the ground corn is concerned, but feel certain that the corn and cobmeal will not show up to any better advantage.

The salt consumption is interesting. More than four times as much salt was eaten where corn and cobmeal was allowed as where ground corn was fed, showing that the cob introduced into the ration encouraged salt consumption, possibly because of the high potassium content, but inasmuch as salt is cheap this makes little difference. That all of these rations were splendid, and that any of the preparations did not adversely affect the new-born pig to any degree is shown by the average weight and vigor of the different groups. The little pigs from the ear corn fed sows weighed 2.51 pounds each on an average; corn and cobmeal pigs, 2.48; shelled corn pigs, 2.42; and ground corn pigs, 2.47. This is a "toss-up," and we should consider all groups as having done equally well. The average vigor was close to 90 percent perfect in all cases. This goes to show that with a large amount of corn in the ration, properly balanced, for brood sows, good, strong, husky pigs can be produced, and we have found that when milk is used to

balance the corn ration, or meatmeal tankage, or alfalfa hay, either ground or fed in a rack, or good green pastures of alfalfa, or red clover, or rape, good, strong pigs can be produced, even though the major portion of the ration is corn; and we have further found that, as a general rule, we have not only got better, bigger, stronger, more thickly-coated and more nicely-boned pigs where we have properly supplemented the corn, but the pigs have cost less money at farrowing time, particularly where we used meatmeal tankage, or alfalfa hay, or milk, or any of the good pastures mentioned.

Corn and Other Feeds.—Corn, as compared to other feeds is more valuable per pound than barley or rye. Good, dry corn has about the same value as ordinary feeding wheat, although any corn in the fall that runs 30 per cent moisture does not compare favorably with wheat, because it is low in the particular material that does the real business in producing hog gains, namely, dry matter. On the dry matter basis, good hard old corn running 10 per cent water, which is considerably below the average, contains in every 100 pounds of corn, 90 pounds of dry matter. In the fall when new corn comes on, particularly in a year when frosts come a little early, 30 percent corn is not at all unusual. Such corn contains 70 pounds of dry matter in 100 pounds, or 20 pounds less than good, hard corn. The comparative value is, therefore, primarily dependent upon the comparative amount of dry matter present in each 100 pounds of these respective corns, or a comparison of 70. with 90. In other words, it will take as many 100 pounds of this softer corn to equal 100 pounds of good hard corn as 70 is contained into 90 or 128.57 pounds, or, comparing it on the other basis, 100 pounds of 30 percent moisture corn is equivalent in feeding value to 77.7 of good hard corn. Of course, this comparison is on a dry matter basis. We believe that in actual practice new corn dry matter is a little more valuable, pound for pound, than old corn dry matter, when both are fed in the natural state; but if one will take the trouble to soak the old corn, then there should be little difference. At any rate, this difference on account of degree of hardness of the grain is relatively small as compared to the big difference in values for each 100 pounds based on the dry matter content. We give this at some length to emphasize that when comparing other feeds with corn it is quite essential to know what kind of corn one is talking about. There is more difference between different corns of varying moisture percentages than there is for instance between good corn and good wheat. It is similar to the old, old story of there being more differences within certain breeds than there is between the average of one particular breed and the average of some other breed.

Soft Corn.—Soft corn varies much, depending on its moisture content, and in determining its value it is well to take a sample to a nearby elevator and have the moisture determined, and then compare the different corns examined upon the basis of dry matter furnished by 100 pounds of each, the dry matter being determined by simply subtracting the moisture percentage from 100. For instance,

if corn runs 30 percent moisture, according to the elevator determination (which, by the way, is an oil method devised by the Government), the dry matter content will be 70 pounds in each 100 pounds (or 100 minus 30 which equals 70). Soft corn is especially good for pigs. They relish it and do well on it, and it is surprising how well hogs will handle soft corn, even though it is quite moldy and of poor appearance. We must remember, however, that with soft corn more tankage should be fed than with hard corn, possibly because the germs are cut short in development. Our advice would be that when soft corn is fed along with tankage it would be well to secure some corn oil cake meal, which is really the corn germs, with the oil mostly pressed out, and feed it in conjunction. In this way tankage will be saved, and the pigs should make more rapid gains.

Corn and Pork Prices.—The great importance of corn has been emphasized by the Food Administration. It realized that swine production in America centers to a large extent around corn, in truth to such an extent that a definite ratio exists between the price of a bushel of No. 2 corn in Chicago compared with 100 pounds of average hogs. This ratio for the ten years ending in 1916 was 11.67 or, more plainly speaking, as an average for those ten years, an average 100 pounds of live hog, Chicago, would buy at the same point 11.67 bushels of No. 2 corn. The commission appointed by Herbert C. Hoover composed of seven members (the author was chairman), determined that on the average it takes, under present (1917) conditions, approximately the equivalent of 12 bushels of No. 2 corn to produce 100 pounds of marketable swine on the average farm. This is not all corn, of course, but it is expressed in corn equivalent; in other words, it might take 9 bushels of corn to do the actual feeding, then the money secured for the other 3 bushels would pay for the risk, interest, supplementary concentrates and other feeds, pastures, depreciation, buildings and marketing. In practice the man who secures 100 pounds of gain from 500 pounds of grain, corn furnishing the major part or upwards of 80 percent, is doing well. This figure includes the feed fed all hogs on the farm, but it takes into consideration no losses except of pigs before weaning time. It is possible to produce pigs from weaning time on to 225 or 250 pounds with an outlay not to exceed 400 pounds of feed for 100 pounds of gain, but this is one of the most efficient periods in swine husbandry, because when we start at weaning time we start with a pig that has a considerable number of charges against him—such as sow feed, boar feed, labor and so on, and that is why weanling pigs sell for much more than the market price. Hence it is unwise for anyone to show how profitable swine husbandry is by using a feeding record which covers a period from weaning time to marketable weight. Such a method is misleading to the novice.

Barley.—This is a fine feed for swine. It is especially used to advantage in the western part of the country, and in some sections

it is the main basal feed. Barley together with alfalfa makes an especially good combination, although not so good as corn and alfalfa. Barley ranks next to corn as an all-around basal feed. Corn in the cornbelt outyields it, and that is an important consideration. Barley is quite palatable and good for all classes of swine, but it is a little too fibrous for taking hogs to a heavy finish. Swine can be pretty well finished on barley, but not so well as on corn, and, furthermore, it takes longer to finish them, hence the tendency in the barley-producing countries is to produce hogs of relatively lighter weights than in the cornbelt, and in some barley sections the bacon type of swine is particularly favorable because of the fact that necessarily good bacon hogs should go to market at around 175 to 200 pounds, and thus barley does not reach the period of its handicap, the high finishing period from 200 up to 300 pounds. Barley has practically the same deficiencies as corn, and the same supplements may be used for it as have been recommended for corn. Barley is healthful, relatively speaking, and produces an excellent quality of pork. The fat is hard and white, and the quality of bacon made from barley, particularly when it is combined with milk, very good. The preparation of barley is more complex than that of corn, because it must be ground or rolled, if best results are to be secured; in truth, it is not profitable to feed barley whole to swine. In practically all cases it should be ground, and preferably wet or better still soaked for 24 hours before feeding. The labor and time spent in correct preparation of barley yield big returns. In the matter of preparation corn grain has a big advantage over barley, because labor and time are saved, inasmuch as the corn does not have to be prepared, while barley does.

Barley is about 85 to 90 percent as valuable, pound for pound, as good dry corn or wheat, though dry barley is more valuable than 30 percent moisture corn. Keep in mind in these comparisons that we refer to a good No. 2 corn, containing not more than 14 percent moisture. One pound of barley dry matter is hardly so good as a pound of corn dry matter.

Wheat.—Because of the great value of wheat for human consumption in ordinary times it cannot be used to a large extent for swine feeding purposes, except in a minor way. Of course there is a great tendency even in war times to feed considerable wheat to swine, but this is because wheat in many sections is really worth less cents per 100 pounds than corn, and, hence is used when such conditions prevail. Being used for human consumption, the price of wheat usually puts it out of the reach of swine. The fact that wheat is used in poultry feeding to good advantage also means that swine have a stiff competitor.

People and poultry can outbid swine for products that are equally well-adapted to all three. As a result, wheat feeding with swine is largely confined to the feeding of its by-products. Wheat is quite palatable, particularly when ground and soaked. It produces a good quality of pork, the fat being firm and of good color. The

germs of wheat contain a toxic property and, other things being equal, it militates against the use of wheat from a physiological standpoint, but only to a minor degree, because there is so little germ present in proportion to the total amount of wheat. Thorough preparation should be given wheat. It should be ground and probably wet or better still soaked before feeding. In some grinding experiments as much as 50 to 100 pounds of wheat has been saved on each 100 pounds of gain by the grinding and wetting (or soaking) process. Wheat is suitable for fattening, and will put on a high finish. It is better than barley, although not so good as corn. Wheat is adapted to all classes of swine. So far as supplements are concerned, wheat has about the same deficiencies as corn or barley, hence the same supplement may be used. If a little wheat or barley or preferably both be mixed with corn, less meatmeal tankage is required to balance the ration, although this difference is not large. In other words, less tankage is required with a mixture of corn, barley and wheat than with any one of them alone in order to secure the best results.

In a senatorial inquiry (March, 1918,) carried on by the Committee on Agriculture and Forestry, of which Senator Gore of Oklahoma is chairman, the statement was made, that 12 pounds of wheat is equal to 20 pounds of corn grain. This is misleading, and not in accord with the facts. Of course 12 pounds of good kiln-dried wheat is equal in feeding value to 20 pounds of real soft corn that runs over 45 percent moisture, but average wheat if compared to good No. 2 corn has no such high relative value as the testimony indicates. Good average wheat is about equal in feeding value to good dry corn, pound for pound, but when it is taken into consideration that the wheat must be prepared a part of this relatively high comparative value of wheat is sacrificed.

Rye.—Rye is a particularly good economic feed where the land is poor, and it can be used to good general advantage in pork production. It is ordinarily considered alongside of corn, wheat and barley as a basal feed, but it is the poorest all-around feed of the four. It is considered that rye must be ground and soaked in order to be used to advantage, because of its hard, flinty kernels. If rye is fed whole many of the kernels pass undigested, as in the case of wheat or barley, hence the reduction and softening process is in order. Rye is generally used as a partial ration to better advantage than as the entire basal ration. In this case it may be used as a partial basal concentrate. Rye sometimes contains ergot, which is detrimental to swine, causing them to abort. Because of this rye has received much really undeserved criticism, which criticism should be charged up to the ergot, but unfortunately rye harbors the ergot growth, and hence must take the consequences of the ergot's unfavorable influence. Good clean rye, however, is fed to advantage. It is generally presumed that large quantities of rye are troublesome, tending to cause digestive disorders, but the evidences of this are conflicting. The same supplements may be used

with rye as with corn, wheat or barley. Rye is worth about 90 to 100 percent as much as corn, depending on relative methods of feeding. The 100 percent figure is high, but figured as a partial feed in the ration it does have a replacement value, pound for pound, with corn. Rye products have not received the endorsement in swine feeding that wheat products have; rye middlings, for instance, being much less popular than wheat middlings, and apparently this is the right distinction to draw between the two.

Sorghums.—These grains are especially good for swine production, although not the equals of corn, barley, or wheat. In the drier sections, as in western Kansas and Nebraska, some portions of California and other locations not favored with abundant rainfall, these dry-land crops are of special economic value, in that they furnish more feed per acre than corn or other grains, which, in turn, means that a larger pork production per acre can be carried on in those sections with these grains than without them. Hogmen living in these localities can tie to these crops, knowing full well that they have a value approximating that of corn. In truth, these dry-land sorghum grains are similar to corn and are used in practically the same way. Alfalfa is especially a great balancer for them in Kansas and Nebraska. Milk and tankage and similar feeds that balance corn grain are used to great advantage in these sections. The dry-land feeds are not so palatable as corn, but on the other hand they produce a good quality of pork. Preparation is necessary. They should be ground and probably wet or, better still, soaked, in addition, in order to make them more palatable, and in order to make every pound of feed more efficient. The returns from grinding are sufficient to justify the statement that it should practically always be done, excepting in rare situations.

Prof. W. A. Cochel and his co-workers at the Kansas station have done considerable work on the dry-land and sorghum grains, and recently there has been reported by Cunningham and Kenny some of the work that Cochel and his co-workers have done. A Kansas station test, which comprised five lots of ten pigs each, the pigs being fed basal feeds as mentioned, shows up favorably for corn, of course. In all cases the grains fed were supplemented with 2.3 pounds of wheat middlings and .4 of a pound of meatmeal tankage per pig daily. The basal feed, daily feed per pig, average daily gain per pig and feed required for a 100 pounds of gain are given in the subjoined table:

Basal Feed	Daily Feed per Pig	Average Daily Gain per Pig	Feed Required for 100 Pounds Gain
Lot 1—Ground kafir.....	4.9	1.40	534
Lot 2—Ground milo.....	4.9	1.43	523
Lot 3—Ground feterita.....	4.9	1.36	549
Lot 4—Ground kaoliang.....	4.9	1.31	572
Lot 5—Ground corn.....	4.9	1.46	514

Note particularly that while corn is superior, in that it produces greater daily gains and requires the least feed for 100 pounds of gain, both ground kafir corn and ground milo maize and even feterita rank up closely. Some other tests in Kansas indicate that ground kafir corn and milo show up favorably in comparison with corn, but that sweet sorghum feed is, to quote the authors, "decidedly inferior to the other grains." "The other grains," of course, refers to ground corn, kafir corn and milo maize. In concluding the dry-land grain topic, it is well to bear in mind that the dry-land sorghums are a god-send to the dry-land farming country in our central western states, and that they are particularly valuable as an adjunct feed in the alfalfa sections situated within or close to the dry-land sorghum country.

Hominy Feed.—Hominy is a by-product of corn grain manufacture. It is a residue remaining after the cornmeal or hominy grits have been removed from the corn kernel. The mere fact that hominy feed must be manufactured means getting a product that runs relatively low in water, around 10 to 13 and once in a while to 14 percent. Being a by-product of corn manufactured entirely by a mechanical process, there being no solution made or chemical changes inaugurated, it is an excellent substitute for corn grain. There are two kinds of hominy feed—one from which the fat has been partially extracted, and the other in which it is left with the germs. Hominy feed itself really comprises the bran, the germ and the floury white starchy portions, the hard flinty parts of the kernel being used for hominy grits or cornmeal. If the germs are fat extracted, this means that when the germs are replaced there is much less fat added to the hominy feed as it comes to the farm than where the fat is not extracted, there being a difference of some 5 percent. In the circumstances then we should naturally believe that the fat-extracted hominy feed is not so valuable as that in which the fat remains, and we should make a difference of about 6 percent in relative values, basing our statement on the facts that a pound of corn fat is worth about two and one-fourth times as much as a pound of ordinary corn starches. But it is good general American policy to extract the fat, inasmuch as it can be used for human consumption, and the extraction of the oil from the germs of corn should be encouraged. While it is true that the feed will probably not be so good for swine, yet we swinemen who believe in the swine business must have the patriotic viewpoint, and put America and its inhabitants first.

A Substitute for Corn.—Hominy is a good substitute for corn, and requires practically the same supplements, but we find in practice that it takes about 20 percent less tankage to balance 100 pounds of hominy feed than it does to balance the same amount of corn. This is presumably due to the large concentration of the germs in the hominy feed, the germs furnishing some of the specific nutritional supplements that are present in tankage. Twenty pounds of hominy feed contains practically the same amount of

corn germs or embryos as 56 pounds of the original shelled corn. The man who has been accustomed to corn feeding can feed hominy feed to advantage, because he can go ahead and use it exactly as he does corn, with the exception that less supplement is required. We must not expect quite so rapid a gain, presumably, because of the higher fibre content. As this book goes to press there appears a Purdue Bulletin showing that recent Corn and Hominy feed tests give results showing corn superior.

Experimental Results.—Skinner and King of the Indiana station and Eastwood of Ohio have found that their kind of hominy feeds apparently are worth more than corn, pound for pound, but in our Ames tests we have found continuously that good, dry corn is more valuable, pound for pound, than hominy feed. Inasmuch as the moisture contents are not given for the corn in the Ohio and Indiana tests by monthly periods, it is hard to say just what quality of corn the hominy feed was compared with. Our comparisons are all made on the basis of 14 percent moisture corn grain. Ames results secured by the author in conjunction with Dunn, pigs being run from weaning time to the time when they weighed 245 pounds, may be of interest. Two lots were fed. Lot 1 was given shelled corn and 60 percent meatmeal tankage and salt in separate feeders; whereas Lot 2 was fed exactly the same except that instead of shelled corn being allowed in one feeder, hominy feed replaced it. The following table shows the results of carrying the pigs from 49 to 225 pounds weight, approximately:

Lot No.	I	II
Days.....	143.00	154.00
Average initial weight.....	48.78	48.72
Average final weight.....	224.82	224.27
Average daily gain.....	1.23	1.14
Average daily feed eaten:		
Shelled corn.....	4.34	.....
Hominy.....	.....	4.53
Tankage.....	.57	.39
Total.....	4.91	4.92
Feed required for 100 pounds gain:		
Shelled corn.....	352.81	.....
Hominy.....	.....	397.27
Tankage.....	46.00	34.50
Salt.....	.003	.000
Total.....	398.81	431.77
Pasture acres.....	.0178	.0190

The results on this bluegrass pasture show clearly that more rapid gains are made on shelled corn than on hominy feed, being more than 8 percent more rapid. The total of feed eaten daily is about the same, but the feed required for 100 pounds of gain shows considerable difference, or approximately 11 percent more feed is required with hominy feed than with corn. With hominy feed it took eleven days longer to reach the same weight, the pigs gained more than 8 percent less rapidly and required more than 11 percent more feed for 100 pounds of gain than corn, but let us remember that the hominy feed saved tankage—some 25 percent on each

100 pounds of gain made. Figuring the meatmeal tankage as equivalent in economic value to 2 pounds of corn, and making an equation of it, 100 pounds of corn equals 105.71 pounds of hominy feed. Note particularly that at the end of the feeding period the hominy feed began to lose out in gains, showing that a little more fibre content apparently tended to retard the gains, hominy feed having the same objections in this respect as barley, only to a lesser degree.

A Test at Ames, Iowa.—On rape pasture we fed pigs shelled corn self-fed plus meatmeal tankage self-fed, plus salt self-fed during the entire time from weaning time—about 45 pounds—to 225 pounds in weight. Lot 2 received the same treatment except hominy feed was given in place of corn to the end of the forage season, and then the last week or two, just before the pigs reached 225 pounds, they were changed over to corn. On the corn and rape the pigs took 132 days to get the desired weight, but on the hominy feed 149 days. Here, again, we have a saving in time on corn. For 100 pounds of gain Lot 1 required of shelled corn 344.4 and meatmeal tankage 37.2, a total of 381.6 pounds; whereas the hominy feed-fed Lot 2 required 340.8 of hominy feed, 72.1 of shelled corn and 32.9 of meatmeal tankage, a total of 445.8 pounds of feed. Where hominy feed was fed it was not the equal of corn. It took practically 12 percent more feed for 100 pounds of gain with hominy feed than with corn, although less tankage was required than usual—in this case practically 12 percent less. By making an equation of these figures it is found that 100 pounds of hominy feed is equal to 82.7 pounds of corn, this on the basis that 1 pound of tankage is considered equivalent to 2 pounds of corn; or, figuring it differently, it took practically 121 pounds of hominy feed to equal 100 pounds of corn. Generally speaking, considering the experiments in Indiana, Ohio and Iowa, one can feel that if he buys hominy feed at a price less than that for corn, pound for pound, he is not faring badly; but if he can buy hominy feed for 10 percent less than corn he is doing well, and if he can buy it at 15 percent less than corn it is a good buy. We must not forget that hominy feed has some advantages, such as its being dry, and can be easily stored. It also does not need to be ground. We are inclined to think, however, that if hominy feed is wet or soaked it will give somewhat better results than when fed dry but we do not have any experimental evidence to back up this statement of belief.

Emmer or Speltz.—This crop is not much used. It is grown some in the Dakotas and in the northern sections of the cornbelt. Emmer is not so valuable as corn or barley. The varieties of emmer that have the least hull are the most desirable. Emmer, in order to give the best results, should be ground, and preferably wet, and better still soaked. Presumably the same supplements may be used for emmer or barley as with the ordinary basal grains.

Potatoes.—Cull potatoes may sometimes be used to advantage in swine production. Potatoes may be used as a substitute for

corn, but they need supplements. Meat and potatoes for humans is comparable to meatmeal and potatoes for pigs. Both are good combinations. The same supplements may be used as with corn. Milk works well with potatoes. Potatoes are a healthful feed, and make a good quality of pork. Potatoes should be thoroughly cooked. Raw potatoes are not relished, and are not digested as they should be. Thorough cooking is necessary to break down the starch granules and the cell covering so as to make the starch more easily accessible and thoroughly digestible. Cooked potatoes may be considered a succulent feed for pigs, and used as such. The cooking process increases their palatability. It takes from 375 to 450 pounds of potatoes when cooked to equal 100 pounds of grain, like corn. To give the best results potatoes should be fed with other feeds of a more highly concentrated character, particularly those that contain less water, for best results, and cooked potatoes, being a bulky feed from the standpoint of the water contained, should be fed liberally, probably three times a day or else kept before the pigs almost continually, so that they can get enough to satisfy. Potatoes are the most valuable, pound for pound, of any of the roots from the standpoint of their ability to save grain. They replace corn and similar grains in the pig's ration just as they replace bread in the human diet.

Peanuts.—Whole peanuts are especially fine for pigs. In the southern states they are used extensively. Peanuts are rich in fat up to 45 and even 50 percent, and hence, though highly palatable and much relished by pigs, produce a soft, oily pork, which is docked from 50 cents to \$2 per cwt., on the live market. The marketable pigs that come from peanut sections are discriminated against by packers, and such discrimination of course has a basis in fact. Soft, oily pork in the packing houses is objectionable. The unfortunate part about the whole situation is that even when pigs are fed corn and milk in the peanut districts, when they go to market they are discriminated against, because buyers have no way of telling whether the pigs as judged on foot have been fed peanuts or not, and, as a result, just because the pigs come from peanut sections they are discredited along with their peanut-fed brothers and sisters. Peanut meal, which remains as residue after the oil has been extracted, when fed in the cornbelt alongside of corn, produces a satisfactory pork product. The Iowa station has done some work on this, and found that corn and peanut meal from which the fat had been extracted, when fed with bluegrass, made satisfactory pork, not quite so satisfactory as corn and meatmeal tankage but nevertheless salable and satisfactory. The oil is too valuable for human consumption to feed to pigs as such. With harvested peanuts it should be extracted, but where hogs do the harvesting then economic considerations, as regards labor saved, enter into the situation, and make it profitable for the whole peanuts to be fed to hogs as the hogs do their own gathering and harvesting. Hence in certain sections of the south the unharvested whole peanut kernels are fed in the shell to pigs.

SUPPLEMENTARY FEEDS

Skim milk.—Of all the supplementary feeds the milks rank supreme. Whole milk is better than others, but in common practice we can hardly afford to feed whole milk worth \$3 per cwt. with butterfat in it worth 50 cents a pound. Better separate the butterfat and sell it as such, and purchase feeds that will take the place of it. Hence the reason why we depend on skim milk and buttermilk when we talk about milk products. Milk is primarily produced for young growing animals. It is splendid for them. It carries all of the essentials of nutrition and is particularly valuable in supplementing corn. We have done considerable experimental work with milk, and often find that a little milk works wonders in the ration. To illustrate: In one test we self-fed for 100 days two bunches of pigs of an initial weight of about 42 pounds. One bunch received buttermilk (which is the equivalent in feeding value of skim milk) at the rate of 1 quart per head daily, while the other group was fed identically except that no buttermilk was allowed. The following table shows the results secured:

BUTTERMILK HAS HIGH VALUE WHEN FED IN LIMITED QUANTITIES. FIVE WEANLING PIGS IN A LOT FED 100 DAYS IN DRY LOT.**

Ration	Shelled Corn, S. F. Wheat Middlings, S. F. Meatmeal Tankage, S. F.	Shelled Corn, S. F. Wheat Middlings, S. F. Meatmeal Tankage, S. F. Buttermilk, not quite a quart per pig once daily.
Initial weight per pig.....	42	42
Final weight per pig.....	155	160
Average daily gain.....	1.13	1.18
Average daily feed eaten:		
Shelled corn.....	3.40	3.54
Wheat middlings.....	.61	.44
Tankage, meatmeal.....	.62	.43
Buttermilk.....	None	1.84
Feed required for 100 pounds gain:		
Shelled corn.....	299.9	299.70
Wheat middlings.....	53.5	37.0
Tankage, meatmeal.....	54.6	36.0
Buttermilk.....	None	155.80

*With the collaboration of Dunn, Scott and others.

**Pigs had access to bone ash, charcoal and rock salt, but ate very little; hence are not charged in this computation.

The addition of a quart of buttermilk per head daily increased the gains, and decreased the grains, and decreased the meatmeal tankage and dry feed consumption because it supplied the elements which are added to the ration by these two feeds. The buttermilk also resulted in producing 100 pounds of grain with less dry matter. Briefly stated, 155.8 pounds of buttermilk required for 100 pounds of grain as compared to the buttermilk group saved 18.6 pounds of meatmeal tankage, plus 16.5 pounds of wheat middlings plus .2 of a pound of corn or 100 pounds of buttermilk saved 11.9 pounds of meatmeal tankage plus 10.6 pounds of wheat middlings plus .1 of a pound of corn. Valuing meatmeal tankage at 5 cents a pound or \$100 a ton, which is reasonable under present conditions,

the wheat middlings at 3 cents a pound and the corn at 3 cents a pound, the value of 100 pounds of buttermilk is equivalent to 91.7 cents when fed in this limited quantity. -

Skimmilk or buttermilk is particularly fine for suckling sows and more especially for young pigs that are following. Next in order it is good for the pigs at weaning time. The younger the pig and the more rapidly growing the more valuable, relatively, are the milk products. They are all-around supplements, and may be used to advantage in producing animals for show purposes or for the feeding of pregnant sows or breeding boars. The milk products are excellent in convalescence of pigs and have helped in saving many a pig.

We have found in most of our tests that 100 pounds of skimmilk or buttermilk is equal in value to 6 pounds of corn plus 6 pounds of meatmeal tankage, when fed in quantities of from 2 to 10 pounds per head daily. This was determined in this way: One group of pigs was self-fed corn and tankage, free-choice style; another group was fed the same with the exception that from 2 to 10 pounds of buttermilk was fed daily per head. Receiving the buttermilk, they held up on the tankage ration, and also saved some on corn for every 100 pounds of gain; so that when we figured the value of the buttermilk we found that 100 pounds of buttermilk or of skimmilk, whichever it might be, saved 6 pounds of corn, in addition to 6 pounds of tankage. With suckling sows and their pigs following, we have found that it has a higher replacement value than this, running up to 10 pounds of each; and in the case of heavier and more mature swine, not so badly in need of milk as the young growing pig or the suckling sow, the value has been somewhat less than 6, running down to say 5 of each. On the basis of per pound of dry matter no feed is so valuable as is milk, particularly whole milk.

Buttermilk.—Buttermilk may be considered as the practical equal of skimmilk, analyzing about the same. Buttermilk may be fed exactly the same as skimmilk. We believe, however, that both should come from tested cows (cows that do not have tuberculosis) or from creameries that pasturize milk, or else it should be thoroughly heated before feeding in order to prevent disease being transmitted to the swine herd. All of our milk products should be carefully handled, so far as disease is concerned. We have done some work wherein we fed grain with buttermilk versus no buttermilk, in which case the buttermilk was fed in very large quantities, practically all the pigs would eat. The pigs were started at about 56 pounds in weight. Group 1 received shelled corn self-fed plus 60 percent protein meatmeal tankage self-fed, plus wheat middlings self-fed, plus rock salt self-fed, all feeds being allowed free-choice style; Group 2 exactly the same, excepting that buttermilk, in addition to the other feeds, was kept continually before them. The following table shows approximately the number of days and the feed required to reach approximately 300 pounds in weight:

BUTTERMILK VERSUS NO BUTTERMILK

Record Heading	Group I	Group II
Final weight.....	296	299
Number of days.....	218	156
Average daily feed eaten:		
Shelled corn.....	4.87 lbs.	2.27 lbs.
Meatmeal tankage.....	.37	.14
Wheat middlings.....	.34	.22
Buttermilk.....	.....	32.16
Rock salt.....	.00+	.00+
Average daily gain per pig.....	1.10	1.54
Feed required for 100 pounds of gain:		
Shelled corn.....	441	148
Meatmeal tankage.....	33	9
Wheat middlings.....	31	14
Buttermilk.....	.....	2091
Rock Salt.....	.4	.1

The buttermilk pigs made the most rapid gains, and 100 pounds of it saved 14.09 pounds of corn, 1.17 pounds of meatmeal tankage, .81 pounds of wheat middlings and .01 of a pound of salt, a total of 16.07 pounds of concentrates, saved by approximately 9 to 10 pounds of dry matter in 100 pounds of buttermilk. This re-emphasizes the high value of milk dry matter. Tie to the milks, remembering always that they are splendid feeds, and that in case of doubt as to which supplement to use, if you can possibly secure milk then you should do so providing of course that it can be obtained economically. Physiologically it is O. K.

There are some milk products now on the market for swine feeding. One is semi-solid buttermilk. It can be compared to ordinary skimmilk on the basis of its dry matter content. If it runs 50 pounds of dry matter to the 100 then it is about five times as valuable as ordinary skimmilk or even a little better than that, because ordinary skimmilk runs around 9½ pounds of dry matter to the 100, the same with buttermilk. Buttermilk powder will run 90 percent dry matter, hence it is nine or ten times as valuable on that basis. We must, however, remember that it has a value because it is dry, and it can be stored and used when needed which, in many situations, makes it more acceptable. The use of buttermilk powders or semi-solid buttermilk for "going round the show circuit" is to be commended as a natural milk substitute.

We should beware, however, of certain milk products that are foisted on the public by the wonderfully extravagant claims made for them. There is one milk product, for instance, advertised to be mechanically reinforced to the extent that if one gallon of it is mixed with 50 gallons of water you have a product that is equal in feeding value to ordinary skimmilk. Wonder of wonders! Here is a new panacea for the skimmilk scarcity. It sounds like the promising story of the Garden of Eden, and I take it that those who believe it will gain as much sorrow from their belief as did Adam and Eve from their "forbidden fruit." On the face of this claim, assuming that the chemically reinforced and highly-advertised milk product is entirely dry matter, which is impossible, when you mix

50 gallons of water with a gallon of it there cannot possibly be more than 2 or 3 pounds dry matter in every 100 pounds of the mixture. On this basis the final mixture would be worth about, let us say, not more than one-fourth to a third as much as good skimmilk.

Meatmeal Tankage.—A splendid feed this that has made good in practice. It has been recently developed in our great pig industry and won its way into the swine pens of America because of its high merit. There are many grades of meatmeal tankage, but, roughly speaking, they may be divided into 60 percent protein grade and the 40 percent protein grade. Of all the available supplements to corn meatmeal tankage (sometimes called meatmeal, sometimes called tankage) ranks alongside of skimmilk, buttermilk, dried milk powders and alfalfa pasture, which are physiologically efficient. Swine relish tankage very much; it is highly palatable. Tankage, in some packing houses, is a by-product of the lard and other grease tanks, the basal tankage in these vats being removed and dried and mixed with evaporated liquid residues from all parts of the plant, which residues are somewhat similar to meat extracts. Sometimes blood is added, so that in the end you have a high-quality 60 percent protein meatmeal tankage, running as much as 15 percent mineral elements, a large proportion of which is bone phosphate. The high heating that the tankage is subjected to precludes the possibility of its being contaminated with disease-producing germs, as it comes from the vats; hence there is little danger of tankage carrying cholera or other diseases when made by high-class concerns.

Tankage is especially valuable because it contains very little carbohydrates, for carbohydrates should be supplied by our natural farm grains. This is an indirect reason for its goodness. True, it is splendid because it runs high in protein of good quality, and let us put emphasis on the quality. Pound for pound there is no other supplement that balances corn to better advantage, and although bloodmeal runs high in protein, yet pound for pound when fed as the lone supplement to corn it is not so valuable as tankage; dried buttermilk is not so valuable, nor is dried skimmilk powder, pound for pound, because it does not run high enough in protein. We are speaking now on the dry matter basis. Everything considered, of course, dried buttermilk powder plus corn would produce gains with less outlay of dry matter than would corn and tankage, but the point is that a pound of meatmeal tankage containing 60 percent protein will go further, in that it would balance a greater quantity of corn than will a pound of buttermilk powder.

Tankage is splendid because it promotes a healthy laxative condition, particularly when fed with corn. It is fine because it contains vitamins, particularly fat soluble, necessary for growth and development, although we have a suspicion that it does not contain as much of this vital element as it should. Tankage is much

relished by pigs of all ages and classes. We feed it at our experiment station with good results to pregnant sows, little pigs, suckling sows and fattening hogs. We feed it from the time of impregnation to the time of marketing, going through the entire gamut of swine production. The fact that meatmeal tankage has gone up in war times to \$110 and \$115 a ton is evidence of the high favor in which it is held by the feeding fraternity.

Fishmeal.—This is a product which is coming more and more into use, and it will give good results in swine husbandry. Being a fish product it is similar of course in nutrition to meatmeal tankage, although it has the objection of having a peculiar flavor. Swinemen can make use of it, feeding it about the same as meatmeal tankage. The better grades of fishmeal should meet an encouraging market in the grain-producing sections.

Linseed Oilmeal.—This is a standard swine feed, and used as a partial ration is all right. It produces a creamy slop, and helps out considerably in producing good coats on pigs. It even affects the new-born pig through the pregnant sow, as some of our experiments show. Linseed oilmeal should not be used as a lone supplement to corn in a drylot, nor to barley, nor wheat, nor rye. It works very well on pasture, however, as alfalfa, rape or clover, when fed in conjunction with corn. Mixed with meatmeal tankage or with milk, it makes a splendid all around supplement. Linseed oilmeal mixed with middlings is not very satisfactory, and in some cases we have had abortions from such a mixture, due presumably to nutritional deficiencies. Add tankage to the mixture and the evil is apparently offset. Oilmeal has for years been accused of causing abortion in swine. There is no question in my mind but that it does, if fed injudiciously as a lone supplement to corn, for instance, or possibly to any other grain. Where it is fed in conjunction with alfalfa, rape, red clover pasture, alfalfa hay, or meatmeal tankage or milk, we believe that the abortion troubles would be limited to a minimum, and thus oilmeal would tend to come into its own more effectively. Avoid a heavy, sudden feed of oilmeal, particularly with pregnant sows. Oilmeal added to corn and other grain rations is instrumental in producing a good quality of quite firm fat. In limited quantities it is relished by swine, particularly when mixed with other feeds, but when fed alone it is not very palatable. When allowed in a self-feeder alongside of tankage, for instance, pigs will eat about a pound or two of oilmeal along with 3, 4 or 5 pounds of tankage. Ordinarily they eat from one-third to one-fifth as much oilmeal as of meatmeal tankage, both being allowed when corn is used as the basal feed. It is not fair in feeding tests to compare oilmeal and corn to tankage and corn. This shows oilmeal up to a serious disadvantage, because the oilmeal and corn ration has certain deficiencies which milk, tankage and pasture overcome. It is much fairer to show what oilmeal will do when added to a corn and tankage ration or to a corn and alfalfa ration, especially when the corn and oilmeal and

alfalfa are checked against corn and tankage and alfalfa. At ordinary prices, oilmeal is a very good "buy," providing of course that it is used wisely in combination with such supplements as milk, tankage, the good leguminous pastures, and similar feeds.

Bloodmeal.—This is a packing house dry product, being the dry blood from mixed animal sources, mostly ox. It runs 85 percent in protein—higher in protein than any of our supplements, but it is too low in mineral matter. The addition of steamed bonemeal to a bloodmeal ration when fed with corn or similar basal feeds helps, as some of our tests show. We believe that bloodmeal fed on alfalfa or rape pasture in conjunction with milk will give very good results, and we would encourage its partial use in these respects, particularly when the prices of tankage and bloodmeal are so close together, as for instance when tankage sells at \$100 a ton and bloodmeal at \$125. As a lone supplement to corn or similar feeds, bloodmeal does not work nearly as well as meatmeal tankage, but fed in conjunction with meatmeal tankage it works splendidly. Packers are therefore putting out tankages containing considerable blood in their make-up. Some day we are going to know how to use bloodmeal to a better advantage than we do now. The addition of bloodmeal to tankage in the packing houses is to be encouraged, so long as they keep the mixture on an efficient basis, inasmuch as it will produce a larger output for the general swine feeding industry. So far the supply of meatmeal tankage has been too low for the best interests of all concerned. Bloodmeal is good for scours.

The more meat and milk products we can add to the swine ration within reasonable limits, and at certain prices, the better off will our industry be, particularly when it is on the present corn and other similar grain "balance basis" and where the natural grain feeds of the farm are fed in large quantities.

Soy Bean Meal.—This is similar to oil meal. It should not be used as a lone supplement to feed to hogs which are quite immature. Bean proteins do not balance corn proteins satisfactorily, unless they are helped out apparently with such feeds as a little milk or a little alfalfa pasture or a little tankage or some similar feed. Rape is fine. More and more soy beans are going to be grown in the future because they are a profitable crop, particularly where they grow well and yield 25 or more bushels to the acre. They make a good concentrated swine feed as they do a good cattle feed. In cattle feeding they have been found to be equal to about the value of cotton seed meal. Our advice to those men who can grow soy beans so they yield upwards of 25 bushels to the acre is to study the plant, and figure on introducing it into their farm systems. But we cannot pass to the next feed without re-emphasizing that the soy bean has many serious limitations as does oilmeal, but that fed in its right place it is a valuable adjunct as a supplement in swine feeding.

Peanut Meal.—Generally speaking, peanut meal is a splendid feed and we would emphasize that for swine production it be as low in fibre as possible; in other words, that peanut meals that contain a minimum of hull be used. We prefer the peanut meal that runs upwards of 38 percent protein and less than 15 percent fibre; in truth, we would like to have it with much less fibre than that if we could get it. Good peanut meal is described as containing not less than 48 percent protein, nor more than 9 percent crude fibre. It is merely a question of the difference in the amount of hulls and vines present. Peanut shells have practically no feeding value because it takes as much energy to digest and absorb them as is present in their make-up. A test with a peanutmeal that ran a little less than 40 percent protein at the Iowa station recently showed that, as compared to corn and tankage, peanut meal in this case being fed with corn, all feeds being fed free-choice style, the daily gains were slightly less or 1.33 as compared to 1.41 pounds. These rations were fed on bluegrass pasture. Figuring the peanutmeal against the corn and tankage we find that 100 pounds of it saved 48 pounds of corn and 45 pounds of tankage, a total of 93 pounds of feed. If the corn is worth 3 cents a pound or \$1.68 a bushel and the tankage 5 cents a pound in this test, the peanut meal had a value of \$3.69 per 100 pounds, which is a rather high value and perhaps more than it is worth. It does show, however, that it can be used to advantage in swine husbandry. We have before indicated that peanut meal which has the oil pressed out produces a satisfactory fat pork, and this is of great moment. However, the raw peanuts with their high percentage (as high as 40 percent sometimes) of fat or oil produce a very oily and undesirable fat pork known as "oily or soft" pork. Peanut meal clearly excels linseed oilmeal when used as a lone supplement to corn on bluegrass pasture, but then in this case if a little tankage had been added to both the rations, the one containing linseed oilmeal and the one containing peanut meal along with corn, or even a little milk, we think much better actual as well as more favorable comparative results would have been secured. Generally speaking, we find that with every 100 pounds of corn pigs eat from two and one-half to three times as much peanut meal in proportion as they do of meatmeal tankage. A happy mixture of the two should work well in practice.

Oats.—Oats are too fibrous to be used to marked advantage. There is a big difference in the amount of hull present in oats of the different varieties and grown under different conditions. Northern oats are best because they are more plump, and weigh heavier to the bushel. One should always prefer the heaviest oats for swine production. Hull-less oatmeal or hull-less oats are much more valuable, pound for pound, than whole oats. For very young, growing pigs some prefer to take the hulls from the oats, and this is good practice. Oats are not very palatable for pigs when fed in large quantities. Oats must be ground and pref-

erably soaked in order to get the most good out of them, and then when they are soaked and the hulls come to the top they can be skimmed off and fed to dry cows or horses. Grinding pays big returns if oats are to be fed. As a fattening ration oats are a disappointment. They are not so valuable as corn, being for fattening from 60 to 80 percent as good; hence it can readily be seen that oats can seldom be used as a finishing substitute for corn. Oats are much better for horses and calves than for pigs. In limited quantity they can be fed to brood sows particularly. They can be scattered about so as to induce exercise, but if allowed at the rate of more than 1 pound daily the practice of feeding ordinary oats is somewhat wasteful, particularly when corn can be bought, pound for pound, at the same price or even at a 10 percent greater price. With our brood sows we have found that oats only added to a corn ration caused the litters to come weak, as when corn alone is fed, and the sows did not do well. When fed along with a little tankage and the major portion of the ration made up of corn it was a splendid feed. It must be fed in limited quantities and presumably ground, although in practice whole oats are splendid when scattered about in the feedlots to induce exercise. It has an indirect advantage in this respect. Oats and tankage fed without any other feeds excepting salt have been disappointing to us for brood sows. This ration has not produced good, strong litters.

Hull-less Oatmeal.—This is a good feed. It is surprising what a difference it makes to take the hulls off oats and leave a by-product such as this. We compared hull-less oatmeal and tankage with corn and tankage and found that about 110 pounds of oatmeal were required to equal 100 pounds of corn on bluegrass pasture. The gains were a little slower, but the pigs did well. We think it best, however, fed as a partial feed in conjunction with corn and tankage or corn and milk. On rape pasture where we made the same comparisons we found that hull-less oatmeal had a value a little higher than corn, pound for pound. Thus it made a splendid showing, and rape made the difference. It is surprising to know just what a big difference the addition of one feed to a ration will make. It emphasizes how little we really know about the actions and reactions of specific feeds. At present oatmeal cannot be bought from the cereal manufacturers because it is being converted into human food.

Wheat Middlings.—This is a very good feed. It is hardly worth while to discuss it because its value is known by practically everyone. Used as a part of the ration it is splendid. We prefer the floury sorts of middlings to those that have considerable bran in them. In truth, the more bran there is in them the less palatable they are, and the less efficient, pound for pound. As a substitute for corn wheat middlings are a disappointment. We have found in some of our tests where we compared, for instance, wheat middlings and tankage with corn and tankage on bluegrass pasture, that it took 159 pounds of standard wheat middlings to equal 100

pounds of corn, and in carrying the pigs from weaning time to 225 pounds in weight it took 225 days on wheat middlings; whereas on corn it took 143 days where tankage was fed in addition. The wheat middlings group did very well in the early part of the feeding period, but when the pigs reached a weight of about 160 pounds they began to do poorly, from the fattening standpoint, presumably because of the fibrous content of the middlings. They simply could not keep up with the corn and tankage-fed pigs. Middlings are palatable to all classes of swine and are particularly good for the boar and brood sow when fed in conjunction with meat products, milk products, or good pastures.

Wheat Bran.—This is a bulky, fibrous feed, more adaptable to the dairy cow than to swine in general, although the brood sow can use some to advantage sometimes. Wheat bran is good in overcoming constipation, and, generally speaking, is a better medicine than feed for swine. There are so many feeds that are better for young, growing pigs than bran that we would discourage the use of the wheat bran, excepting as a medicine.

Cottonseed Meal.—This swine feed is used to considerable advantage in the south, but not very much in the northern sections. If it comprises much of the ration for any considerable time, pigs are liable to be lost from its use. So far it has not been demonstrated with swine that the poisonous effects of cottonseedmeal can be obviated in any major quantity for any considerable period of time, soaking, cooking and other remedies having been tried. Iron sulphate mixed with cottonseedmeal is said to be of value, but some cast a question on its efficacy. Anyhow, cottonseedmeal has not made much of an inroad into the corn-balancing competition with our substantial supplementary feeds for swine production, although it is used largely in the feeding of cattle. We recommend to those who would use cottonseed meal that they alternate it in the ration, feeding it for say two weeks and then discontinuing it for say two weeks, alternating with meatmeal tankage or milk or linseed oilmeal.

Cull Beans.—Beans are good for pork production, but had best be cooked. They should also be fed as a partial ration. In practice considerable baking soda mixed with beans in cooking is said to be of much advantage. Ordinarily culled beans can be bought in the northeastern section of America to good advantage, but in the cornbelt it is seldom that we see them.

Gluten Feed.—This feed has been disappointing in its results with swine. It is a much better cattle and sheep feed. Swine do not relish it when fed alone, although when mixed with milk they take to it. As a lone supplement to corn it is inefficient and should not be used in drylot in that manner. It is quite fibrous; in fact, almost too much so for ideal fattening purposes. Our best results have been secured with gluten feed when it has been mixed with tankage, half and half, and allowed on rape pasture. In this case

it was worth the money (1917) when fed in conjunction with corn. We tried it as a complete substitute for corn on rape, but the results were unsatisfactory. In drylot we fed gluten feed mixed with tankage, half and half, in conjunction with corn, both being allowed free-choice style. On corn and tankage it took 136 days to take fall pigs from 52 to 250 pounds, requiring 360 pounds of corn plus 35 pounds of tankage, a total of 396 pounds of feed. Where the tankage was mixed with gluten feed, half and half, it took 150 days or two weeks longer, and the feed requirement was 350 pounds of corn plus 40 pounds of gluten feed plus 40 pounds of meatmeal tankage—a total of 430 pounds. In this instance the 40 pounds of gluten feed saved 10 pounds of corn, but lost 4 pounds of tankage, in addition to its taking more time in feeding. This is interesting testimony, but we hope to show some day just how gluten feed can be used to better advantage than we have been able to demonstrate so far. With cattle and sheep we have found that it works well in certain situations. Feeders have not been slow to appreciate that corn gluten feed is all right when put in its right place.

Corn Oil Cakemeal.—Corn oil cakemeal is a much different feed from corn gluten feed because it comprises the germs of the corn with the oil pressed out. Gluten feed, on the other hand, is really the bran plus the flinty portions of the kernel plus the so-called corn solubles, these being secured from the big tanks in which the corn is previously soaked to soften it. The solution taken from the tanks is really a sulphurous acid solution, the sulphur having been burned and the resultant fumes therefrom run into the water solution in order to make the sulphurous acid, which acid prevents fermentation, and thus allows the corn to soften without spoiling. It is then ready for the manufacturing process, degerminating and crushing. This preliminary soaking solution is evaporated down, and then added to the bran and flinty portions of the corn kernel to make the gluten feed. Strictly speaking, corn gluten feed does not contain any of the germs, although some concerns are said to include them. This germ inclusion should be helpful. Corn oil cake meal has nutritious properties differing from gluten feed, and we have found that it is especially valuable in saving meatmeal tankage when added to a corn and meatmeal tankage ration. A number of our Iowa station tests show clearly that 100 pounds of corn oilcakemeal added to a corn and meatmeal tankage ration on timothy pasture has been instrumental in saving 80 pounds of corn and 40 pounds of tankage, a total of 120 pounds of feed. The following figures gathered by the author, in conjunction with Dunn, covering this point are of interest:

Corn Oil Cake as a Partial Tankage Substitute

Six 50-Pound Weanling Pigs to Each Group—110 Days—June 15 to Oct. 3, 1917

Average Group	Average Final Weight Per Pig	Feed Required for a Hundred Pounds Gain:				The Total
		Daily Gain	Shelled Corn	Meatmeal Tankage	Corn Oil Cake Meal	
I	170	1.11	347	45	None	392
II	183	1.22	303	19	58	380
III	201	1.38	325	42	6	373

One can use corn oilcakemeal in limited quantities mixed with tankage. We have found it also works well with milk, when we are depending on supplements to corn. Corn oilcakemeal alone, however, is disappointing. It and tankage do not work well together, but corn, corn oilcakemeal and tankage make a splendid combination when properly compounded.

Alfalfa Hay.—Alfalfa hay has a wide field of usefulness in the ration of the brood sow. This is true in the western as well as the eastern and central states. It can be placed in a rack, and ordinarily brood sows will eat enough of it to balance the corn or other grain ration which they receive. We want to be sure, however, that the sows receiving the basal grains such as corn, barley, wheat, without other supplements, eat at least 1 pound of alfalfa hay per head daily; if they do not, difficulties at farrowing time may be experienced, as evidenced by small and weak pigs. We have ground alfalfa and mixed it with the corn ration and secured excellent results. Some figures on the use of alfalfa as a brood sow ration are interesting. They follow:

Use Alfalfa When Feeding the Brood Sow

Results—Animal Husbandry Section of the Iowa Experiment Station

Ration Fed	Average Daily Gain	Average Feed Eaten Daily		Size of New-Born Pigs Weight Average	Strength of Pigs			Feed Cost of New Born Pig Cents
		Corn (Shelled Basis)	Supplement		Strong	Medium	Weak or Dead	
Ear corn only.....	.35	3.65	None	1.74	Per Cent 68	Per Cent 16	16	41
Ear corn plus 13 per cent tankage.	.63	2.75	.43	2.23	93	5	2	22
Ear corn plus alfalfa in a rack....	.63	3.74	1.11	2.29	89	8	3	26

A little tankage fed along with the basal grain feed and alfalfa helps out as does a little milk. Alfalfa hay is not well adapted to fattening hogs, although it has been used in Nebraska with fairly good results. We must emphasize the point, however, that swine must not be made to eat it too closely. The leaves are much better than the stem portions, which are too fibrous.

Roots.—Roots are splendid for swine production where they can be grown to advantage. They have nutritional values entirely out of proportion to their dry matter content when viewed in a practical sense. The Danish people have done considerable work with roots. They find that 1 pound of grain was replaced by 4 pounds of sugar beets or 5 pounds of fodder beets or $6\frac{1}{2}$ to $7\frac{1}{2}$ pounds of mangel beets. It will be seen from this that roots really are instrumental in saving grain. In some situations like in the northern sections of the country, where roots grow to good advantage, as in Canada, they have a profitable field of usefulness, particularly for brood sows and maintenance stock.

Miscellaneous Feeds.—Oat hulls are a poor swine feed, really practically worthless. Acorns are splendid where they can be found in abundance, particularly when the hogs gather them themselves. They produce a soft, oily pork, however, and need to be balanced with good supplements, as corn. In acorn feeding, the pigs should be hardened with good hardening feeds, such as corn, barley or similar feeds. Peanut hulls are not adapted for swine feeding. They are too coarse, rough and fibrous.

Corn silage is too bulky and fibrous for hogs. Its greatest field of usefulness is with brood sows. When corn silage is offered to hogs they usually prefer to eat the corn first and then maybe a little of the leaves. If they are kept real hungry, they will of course eat considerably more, but this is not a profitable procedure.

Garbage.—Garbage is a splendid swine feed. It can be utilized with swine to good advantage. It takes from 5 to 8 pounds of garbage to equal 1 pound of mixed grain. To feed garbage successfully it should be fed in large quantities, and kept before pigs practically all of the time. Fattening hogs should not be made to clean it up too closely. Better let the brood sows and the stock hogs clean it up after the fattening hogs have eaten the best. Garbage-hogs should be immunized, because there is more danger from cholera in garbage feeding than from ordinary grain feeding. Garbage hogs shrink on going to market, and do not dress out so high as grain-fed hogs, but ordinary kitchen garbage produces a good quality of pork. If garbage, however, were made up of acorns and peanuts and other soft pork-producing feeds, one could hardly say that it would be good in its effects on the pork. Inasmuch as there are garbages and garbages it is difficult to say much about the quality of pork it will produce unless one knows the kind of garbage.

Condimental Feeds.—Condimental stock feeds usually are to be discouraged in swine production, because they are commonly bought on faith. They are a mixture of many ingredients and hence have the disadvantages of mixtures. They consist of ingredients that oftentimes have not been demonstrated to be necessary. They may be "guess" mixtures. They are sold by experienced salesmen, usually, and that means that the buyer must "look out."

They are relatively expensive, and generally are a poor gamble. This does not mean, however, that a condiment cannot be made that will be useful, particularly when it is made up of those feeds that we know are good in practice, such as salt, wood ashes, charcoal and other feeds, but, generally speaking, one "jumps in the dark" when buying these feeds. It is surprising how little we know about feeds and feeding. We must still place much dependence on the appetite of the pig for different feeds, and learn to depend on those feeds in a large measure that have given success in our practical experience, but ever and anon keeping our periscope polished up and in use, looking for a better way, realizing always, however, that there is danger in showing too much interest in any feeds that are made to sell for a profit rather than to get economic and physiological returns. The standard feeds are the ones to bank on in major swine feeding operations. There are good commercial by-products that are made into fine feeds, however, such as meatmeal tankage, hominy feed, hull-less oatmeal, bloodmeal, buttermilk powder, bonemeal, fishmeal and many others, and these should receive our patronage where conditions warrant their use. But bank on home-grown feeds as a rule. For the major portion of the basal as well as the main supply of the supplementary feeds depend on corn, barley, alfalfa, clover, rape and similar feeds, and buy the best you can find to round out your ration, keeping in mind not the idea of the "price per ton" but the "return for dollars invested." To emphasize this bear in mind that meatmeal tankage that costs \$110 a ton in war as well as in normal times is better than peanut hulls, even though they be given to you, if you use both as pig feeds to balance ordinary grains.

CHAPTER IV

THE FREE-CHOICE SYSTEM

Let us fix in our minds at the outset what we mean by the free-choice system of feeding. This system, experimentally demonstrated and developed by the Animal Husbandry Section of the Iowa Experiment Station, is one wherein the animals fed are allowed to have the feeds placed before them in separate containers, so that they may choose or partake of whichever they will. These feeds may be continuously kept before them or they may be allowed periodically. In the former case the system then would be free-choice self-fed, but in the latter free-choice hand-fed. In the former case self-feeders with different feeds within will be placed before the animals, and in the latter open troughs would naturally be used, each containing a separate feed, these to be placed before the animals, which will eat what they will, and after a certain limited time, say an hour or two, or at such times that the animals are satisfied, the troughs may be removed, to be replaced again at a later period. Self-feeding may be practiced with a mixture of feeds; in other words, corn 90 parts and tankage 10 parts, both ground and mixed together, may be fed in an open container. On the other hand, these feeds might be fed free-choice style, both in separate troughs. Let us not, therefore, confuse self-feeding with free-choice feeding; they are two separate and distinct plans.

Does Self-Feeding Pay?—It does, particularly when one wishes to fatten animals. One can even self-feed brood sows, and this is consistently done on pasture, the pasture in this case being self-fed, or sows may be self-fed on alfalfa hay allowed in a rack, or ground alfalfa mixed with the grain ration, and so on. But in these cases the character of the feeds is such that when self-fed they do not unduly fatten. When we wish to self-feed fattening animals we instinctively use the most highly concentrated feeds, such as Indian corn, milk, and meatmeal tankage, white flour middlings, young tender alfalfa, rape, or clover, and other pastures, and so on. In all of our tests with self-feeding versus hand-feeding, when we used a ration the basis of which was corn those with young growing and fattening pigs as well as for fattening shotes and fattening sows have practically all shown up in favor of self-feeding, in that there is a greater average daily gain made, more feed eaten daily, and less feed required for 100 pounds of gain by the self-fed group. This of course means greater profit on the pig, if any profit is made, and that at less labor cost.

Returns From Experiments.—It would be superfluous to set out even a small portion of our experiments, but we are giving a couple which illustrate the practicability of self-feeding. In one experiment where we fattened well-grown yearling hogs weighing

about 125 pounds, self-feeding them for a period of 76 days, the groups self-fed and hand-fed respectively, both given corn, showed results as follows: The self-fed pigs outgained the hand-fed pigs, making 2.05 as compared to 1.87 pounds daily—more than a 10 percent increase; ate more feed daily, showing that under this system of feeding they could work at higher speed, or 9.21 pounds as compared to 8.79 pounds daily per hog, an increase of close to 5 percent; required less feed for 100 pounds of gain, or 449 pounds as compared to 469, a saving of 20 pounds of corn on every 100 pounds of gain produced when the animals were self-fed as when compared to where they were hand-fed twice daily.

At another time young two and one-half-month-old pigs were taken and during the first 100 days of the trial the self-fed group, which was given shelled corn, wheat middlings, and tankage in separate feeders, gained 1.13 pounds, requiring 408 pounds of feed for 100 pounds of gain. The group fed three times a day gained practically the same (they were fed free-choice style also, feed being placed before them three times a day, in open troughs); but required 10 pounds more feed for 100 pounds of gain, namely, 418. The third group fed twice a day gained more than 10 percent less rapidly or .59 of a pound daily and required 430 pounds of feed for 100 pounds of gain. Peculiarly enough the gains were more expensive in the hand-fed groups because they ate a larger portion of the expensive feeds, namely, of wheat middlings and tankage in proportion to corn. This is what should be expected on physiological and general nutritional grounds.

Self-Feeders on Pasture.—On pasture we have fed some groups, self-feeding them as compared to full-feeding them by hand, with gratifying results for self-feeding. One summer on timothy-clover pasture two groups were fed, one receiving a self-fed free-choice ration of corn and tankage, and the other a full-fed ration of corn hand-fed plus as much tankage in addition two times daily as was eaten by the self-fed free-choice group. These pigs were started out when they weighed 53 pounds and were fed from July 6 to Nov. 13 on pasture, and if at the close of the pasture season the pigs in each group did not average 225 pounds they were continued until they did. The figures therefore, taking the pigs from 53 up to 225 pounds, show that where they were self-fed free-choice style it took 120 days as compared to 148 days where they were hand full-fed. Tankage was kept the same. The big difference then is in the amount of corn allowed and in the method of its allowance. Of course where they are self-fed they eat much more than where they are hand-fed, because they have it continuously before them and they can eat night or day. Here is a saving by self-feeding of some 28 days, or practically a month. This means considerable in the fall in getting pigs off to market, because the market begins to decline in September and usually hits the bottom along in January or February, and every day that a man keeps his pigs after September he is keeping them on a steadily declining market. This statement is based on the average of a number of years.

In regard to the feed for a 100 pounds of gain, the self-fed group took 353.1 pounds of shelled corn as contrasted with 389.1 pounds where they were hand full-fed twice daily. Here is a difference of 36 pounds of grain on every 100 pounds of gain saved by self-feeding. This is just on the corn, yet there was also a saving of tankage, self-feeding requiring 26.9 pounds as compared to 31.2 where hand-fed, a difference of 4.3 pounds on every 100 pounds of gain. Actually less pasture was required for 100 pounds of gain where the animals were self-fed than where they were hand-fed, or .012 as compared to .013 acre. In other words, it took a twelfth more pasture for every 100 pounds of gain where the animals were hand-fed, simply because during the nights and the middle of the day, when there was nothing else to eat, they would eat pasture, and also because, under this system of feeding (that is, hand-feeding), they actually require more total protein supplement daily per pig to balance the ration than where self-fed, hence eat more pasture; but this has a nutritional basis which is too complicated to enter into here.

Beginnings of the Free-Choice System.—In the Proceedings of the American Society of Animal Production in 1916 and 17 there appeared two papers, one entitled "The Pig Versus the Feeding Standards," and the other "The Pig Versus the Feeding Standards: Further Progress," both being contributed by the writer from the Animal Husbandry Section of the Iowa Experimental Station. In those papers is given the results of taking pigs on the feeding standards versus the free-choice system up to the age of 8 months, taking the pigs when they were 2½ months of age. The method of feeding was as follows: Lot I, free-choice system (self-fed). Shelled corn self-fed plus wheat middlings self-fed plus tankage self-fed. Lot II, same as Lot I, excepting hand-fed three times daily. Lot III, same as Lot I, excepting hand-fed two times daily. Lot IV, Dietrich or Illinois system, hand-fed twice daily the same feeds as used in Lots I, II, and III, these being all mixed together before feeding; water allowed at free-will. (The Dietrich system was worked out by Dietrich, formerly of the Illinois Experiment Station, after 10 years of laborious investigation.) Lot V, same as Lot IV, excepting that water was limited according to standard. Dietrich would weigh the water also and apportion it on a certain specific basis. Lot VI, Kellner system, a German system of recent origin. Hand-fed twice daily the same feeds as in other lots, all mixed, however, before feeding. Lot VII, Wolff-Lehmann system, also a German standard of "old-time" origin. The same feeds fed as in other lots, but all mixed together, according to this standard—so much of protein, carbohydrates, fats, and so on, in feed for each 100 pounds of pig daily as per standard. It differs somewhat from the Dietrich and Kellner standard in method of procedure, and so on. Lot VIII, free-choice mixture of the feeds used above, this mixture being based on the average as consumed by similar pigs when self-fed free-choice style, which mixture was 89 parts shelled corn (ground after the first 60 days

to keep the pigs from sorting out the tankage and middlings which they preferred), 5 parts wheat middlings, and 6 parts of tankage, all thoroughly mixed together and self-fed.

Inasmuch as 225 pounds is a handy marketable weight, the figures represented pigs taken to that weight, but remember, before we study the following table, to note that after we had continued these standards six months the pigs were all put upon self-feeders and allowed the feeds free-choice style in each group. When this change took place it was marvelous to note how the groups previously fed according to the artificialized standards began to improve, making more rapid gains than before, and, generally speaking, requiring less feed for 100 pounds of gain. The table gives the results as regards the pounds of feed eaten daily per animal during the period from the beginning of the test until they weighed 225 pounds; also the number of days required until they reached that weight, this being based on the actual age of the pigs:

AVERAGE POUNDS TOTAL DAILY FEED EATEN PER HOG DURING PERIOD

The Group	Days Required (Age in Days)	Up to 225 Pounds		Up to 300 Pounds	
		Actual	Per 100 Pounds Live Weight	Actual	Per 100 Pounds Live Weight
I	229	5.363	4.348	5.307	2.999
II	234	5.434	4.353	5.480	3.155
III	250	5.087	4.120	5.379	3.260
IV	256	4.919	4.072	5.319	3.365
V	268	4.800	3.892	5.159	3.096
VI	271	4.436	3.649	4.929	3.202
VII	294	3.994	3.489	4.521	3.152
VIII	276	4.358	3.719	4.645	3.017

This table in itself is better appreciated on close study. Note that the least number of days are required in the three free-choice groups fed (Lots I, II, and III), whether self-fed or hand-fed, and that the feeding standards were good, depending on their chronological origin; in other words, the newer standards are the best. We can more thoroughly appreciate this table in comparison with one other. The following table shows the feed required for 100 pounds of gain in the various groups, taking the groups up to 225 pounds in weight:

FEED REQUIRED FOR 100 POUNDS OF GAIN UP TO 225 POUNDS

The Group	Shelled Corn (14% Moisture)	Wheat Middlings	Meatmeal Tankage	Bone Ash	Charcoal	Rock Salt	Total
I	356.09	44.83	43.49	.07	.12	.14	444.74
II	350.77	52.83	48.31	.03	.11	.09	452.14
III	359.79	65.82	49.47	.12	.09	.09	475.40
IV	391.31	44.60	43.51	.07	.06	.12	479.56
V	402.80	44.58	45.00	.03	.23	.11	492.75
VI	352.58	55.29	56.94	.12	.19	.05	465.16
VII	379.68	46.29	42.37	.05	.35	.04	468.79
VIII	417.46	22.70	29.66	.03	.37	.06	470.28

Note here again that the least feed was required for 100 pounds of gain in the self-fed free-choice group. It is well here to reproduce in closing the free-choice system discussion a part of the summary and some suggestions presented before the American Society of Animal Production by the author in 1916.

Summary and Suggestions.—1. The free-choice system for growing and fattening weanling pigs has a great field of usefulness, because it enables swinemen to secure approximately maximum growth and development on pigs.

2. The appetite of the pig is apparently a fairly reliable guide as to bodily needs; at least it appears to be quite trustworthy with certain combinations of feeds.

3. The feeding standards, although actually quite easily understood, are nevertheless considered bothersome, difficult of execution and complex by the average swine feeding layman. The free-choice system of swine feeding stands out in remarkable contrast because of its simplicity.

4. Broadly speaking, the feeding standards are relatively valuable in the order of their chronological origin. In their application to cornbelt lard-type swine the newest standard—the Illinois or Dietrich (water preferably allowed at free-will)—appears best adapted in taking pigs from weaning time until they reach 8 months of age. The Kellner comes next, and the Wolff-Lehmann, the oldest, last.

5. The great question as regards the best measure of value or the best yardstick to use in determining which system or standard is most efficient is ever with us. Shall success be measured by: (a) Daily gain or days required to reach a certain weight or finish; or (b) feed consumption ability; or (c) feed required for a unit gain, both quantitatively and qualitatively speaking; or (d) the degree of health and immunization against disease; or (e) the net resulting carcass with its smoothness, muscular or fatty development, hardness or softness, and other variable characteristics; or (f) longevity; or (g) reproductive ability? Fashions change; the carcass that is best today may be economically wrong tomorrow. The ideals we picture in the morning often become altered through the progress of the day, so that when the shades of night come we have a different idealistic endpoint. From man's standpoint, the feed consumed per unit gain, the daily gain, the final product and the healthiness of the pigs are major considerations, but from the standpoint of the pig, health, longevity, and reproduction should mean most to the porcine race.

6. Disappointment should not be felt if sow or boar pigs intended for breeding fatten and mature quickly when opportunity is provided, as in the free-choice self-feeding system. We have selected cornbelt swine for many generations, emphasizing early maturity. If our stock did not mature readily when given the

opportunity, that is, when provided with an abundance of suitable concentrated feeds, we relegated them to the discard, selecting only those for breeders which would under these conditions finish quickly and nicely. To prevent undue fattening, therefore, we must provide inhibitors to overcome long years of effective selection; inhibitors such as limited feed, bulky feed, and others.

7. Apparently for the most perfect development there should be many feeding standards devised, the number necessary depending on the goals sought. It may be advisable to have a standard for six-month feeding or eight-month feeding; or, on the basis of weight, one suitable for carrying pigs to 225 pounds; another to 300 pounds, and still others to other weights.

8. Pigs held back or retarded in their growth (provided retardation is not too severe) may catch up in weight later if nutritive conditions are abundantly improved. To the judge of live stock the conformation of the retarded pigs, after their development, appears somewhat different, being more refined in a certain sense than that of pigs fed normally. This retardation may be brought about in numerous ways, but it is interesting to note that pigs, even though self-fed, may be retarded greatly when the feeds allowed are exceptionally good in quality but wrongly mixed.

9. The character of the feeds used, as well as their kind, affect the feeding standard requirement. So long as we depend on approximate group values, as measured by the broad terms protein, nitrogen-free extract, crude fiber, ether extract, and so on, so long will we secure widely variable and disappointing results.

10. Our observations suggest strongly that the type of pig used will surprisingly affect the feeding standard requirement. Apparently there should be a standard for every type.

11. In short, the feeding standard requirement is altered by many outstanding factors: (a) The goal sought as regards age, weight, finish, final product, and other essentials; (b) type and breeding of pigs used; (c) character and quality of feeds depended upon; (d) methods of feeding, as times per day, soaking, grinding, cooking and slopping; (e) systems of management, as exercise, control, housing conditions, castration and spaying; (f) health, thriftiness and natural vigor (disease infection and parasitic infestation play an important role), and (g) climate. There may be others.

12. Practice has changed wonderfully in the last 100 years as regards market weights of swine. In the old days it was not unusual to market entire droves of hogs weighing 500, 600 and even up to 800 and 900 pounds. To make such hogs roughing was in order. These studies tend to emphasize the correctness of that scheme. But there has been a great change in market fashion, so that nowadays the average marketable handy weight of 225 pounds is in most consistent demand. To meet new demands we must

devise different methods and modern methods. It is apparent that the man in the field has not altered his methods of feeding to keep pace with market changes and demands. Hence the reason why self-feeding pigs to handy weights has been long neglected. Instinctively we tend to do things as our fathers and grandfathers did them, but this may sometimes be a virtue; so too such imitation of methods may seriously retard real progress.

13. The development of the free-choice system of swine feeding marks another stepping stone in progress toward more efficient methods of swine feeding. It provides a new viewpoint, a new attitude, a new basis for thought and action. It is profitable to look forward to the development of the best possible free-choice system; in the meantime keeping clearly and steadfastly in mind that we can improve upon the pigs' own method of selection.

Self-Feeding Don'ts.—In closing the chapter it may be well to repeat a few self-feeding "don'ts" which are to the point:

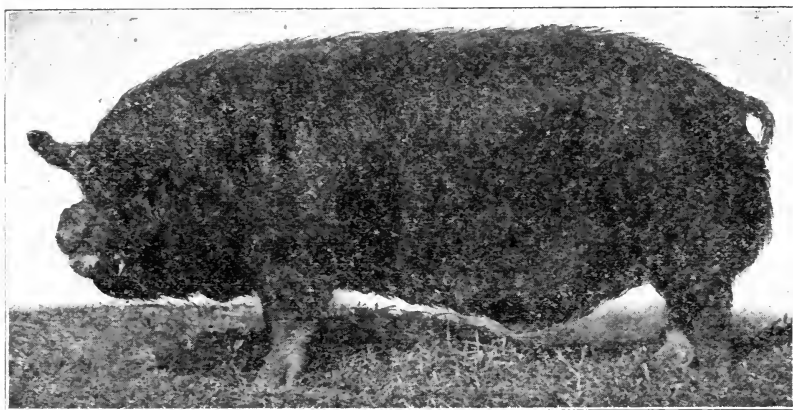
Don't depend absolutely on the self-feeder for all classes and kinds of swine. Don't self-feed if you don't want relatively rapid gains, or if you wish to grow pigs along slowly unless of course you use bulky feeds, such as pasture or hay. Don't self-feed pregnant sows on highly-concentrated feed, excepting early in the breeding season, or unless you mix bulky feeds, such as ground oats, alfalfa meal, or bran with feeds. Don't expect the self-feeder to save all the work, because it won't. Don't think that although the "self" method works out meritoriously in many circumstances with hogs, that the same would be true of beef and dairy cattle, horses, sheep, poultry and goats. Don't always expect the hog economically to balance the ration, no matter what feeds you allow. The hog is not an economist; he is a physiologist by instinct; he will eat to suit himself, and if you feed him sugar he disregards the price. But it is surprising how well the hog likes corn. In the cornbelt it is the one great feed for swine, and is most admirably adapted to self-feeding. Don't you know that hogging-down corn is practiced by farmers because it pays? Don't you know that it is "the most natural self-feeder method" of harvesting corn? Don't expect pigs on dry, hard bluegrass to do well when self-fed on corn. Either "green-up" the grass or supply rape, alfalfa and the like. Don't self-feed and expect the optimum results unless you keep water before the hogs, so that they be continuously satisfied for drink. Don't self-feed tankage or meatmeal if you limit the corn ration and expect the pigs to eat as little as when self-fed. When the pig gets hungry, it is eat tankage or nothing, and he eats the tankage, and the tankage consumption in this case is a little lighter, but it is now considered a fair practice to self-feed tankage, even though the corn is hand full-fed, because we have learned that hogs which are receiving a somewhat limited ration of corn, limited by whatever means, actually require more protein feeds daily than when the corn is self-fed. Don't expect the self-feeder to be a panacea for all feeding troubles, because to expect that is to expect that the millennium has come.

PART III
BREED HISTORIES
CHAPTER I

THE BERKSHIRE

By H. T. MORGAN

Most authors take the position that the Berkshire is the oldest of the existing breeds of swine, and while its ancestry is somewhat obscured in antiquity I doubt whether it has a rightful claim to the title of being the oldest of the present-day breeds. Prior to about 1850 the Berkshire was not much like the pig of that name that we recognize today as the "aristocrat of the swine breed." Indeed it



A Grand Champion Berkshire Boar

was not until a number of years after 1850 that the black color, with "six white points," became well established, or "fixed" as a breed characteristic. During the past few years the writer has given a considerable amount of time and study to the work of compiling a history of Berkshires, and in his research has traveled some thousands of miles in visiting the older breeders in various parts of the United States. I have had much correspondence with breeders of Berkshires in England and Canada, and have had, I believe, access to most of the historical matter pertaining to the subject on file in our large public libraries. Everybody knows that the native home of the Berkshire is in England, where it is supposed to have been developed as a breed in the counties of Berkshire and Wilts in the south-central part. Other neighboring counties were also prominently associated with the development of the breed. Back in 1789 Culley, a historian of note, wrote as follows:

"The most noted breed of hogs in this Island is that excellent kind generally known as Berkshire pigs, now spread through almost

every part of England, and some places in Scotland. They are in general reddish-brown, with black spots upon them, large ears, hanging over their eyes, short-legged, small-boned, and exceedingly inclined to make fat easily."

Culley also testifies to the large weight of the breed, and mentions animals weighing well over 1,100 pounds. Surely the foregoing description does not fit the present-day Berkshire.

Early Improvement.—The early improvement of the Berkshire was undoubtedly due to the refining influence of a generous introduction of Chinese, Siamese and Neopolitan blood. In 1842 Prof. Low wrote as follows:

"The Berkshire breed has, like every other, been crossed and recrossed with the Chinese, or Chinese crosses, so as to lessen the size of the animals, and render them more suited to the demand which has arisen for small and delicate pork."

In 1830, according to Youatt, the Berkshire was still classed as a larger hog, sandy or whitish-brown in color, spotted regularly with dark-brown or black, the body covered with long thin, soft hair (sometimes curly), and free from bristles. The ears were erect and fringed with long hair, the head and snout short, body thick and compact, legs short, skin thin and bacon of superior quality. At this period we see a long step in the line of improvement, but we of today would scarcely call such an animal a Berkshire. At that period (1830) it was regarded as "one of the best breeds in England."

Pioneer Breeders.—In my opinion it is to Heber Humfrey of England, J. C. Snell of Ontario and N. H. Gentry of Missouri to whom the greatest credit must be accorded in the later development of the modern Berkshire, and it is due to the constructive ability and persistent enterprise of these men that the type of the breed has become fully established and recognized throughout the world. Berkshires were first brought to America in 1823, according to A. B. Allen of New York. Mr. Allen was an admirer of the breed, and did much to encourage its early popularity in this country. In 1841 he himself imported 41 head, after personally inspecting many of the British herds, and subsequently made other importations.

Commencing about 1840, many Berkshires found their way into Ohio, where they became popular in the great Miami Valley in the vicinity of Cincinnati, at that time the greatest corn and hog-producing section of the United States. The breed's popularity continued to increase until about the time of the Civil War, when breeders, for some unaccountable reason, allowed their herds to degenerate, so that at the beginning of about 1870 but few good representative specimens were available in this country. It was approximately in this period that John Snell of Canada imported his first "English Berkshires," and they soon attracted the attention of N. H. Gentry, who, then a young man, went to Canada and brought home a number of the best individuals from the Snell herd. It was early in the 70's that T. S. Cooper of Pennsylvania imported a number of choice Berkshires from England, and it was "Cooper

in the East and Gentry in the West" who put Berkshires on the American map.

An English Authority.—One of the most interesting contributions to the history of the breed is a letter which I received a year ago from Edgar Humfrey, secretary of the British Berkshire Society, whose father, the late Heber Humfrey, was the first secretary of the British Berkshire Society and the most noted breeder of Berkshires in his day. Edgar Humfrey at my request visited a number of the older breeders of Berkshires in his country, and obtained from them valuable data with reference to the Berkshire of England from a time dating back as far as 60 years ago. These data supplemented by notes left by his late father, who began the active breeding of Berkshires in 1862, give a fund of authentic information which I believe should be preserved in book form. J. Pittman King of North Stoke, Wallingford, is the oldest living breeder of Berkshires in England today. He started his herd in 1862. He states that in 1850 there were in Berkshire, England, several large herds which had been carefully bred. These hogs possessed great length of body and rather long heads, with ears standing forward. The general color of these hogs was black, with occasional splashings of white, but at that period no special effort was being made to breed white points in any particular place. Mr. Pittman states that in about 1855 more attention was being given to setting a standing of white points on a black ground. Mr. King was one of the founders of the British Berkshire Society in 1884, several years after the American Berkshire Association was established.

Russell Swanwick of Cirencester, another English breeder, engaged in the business in 1867, and is still in the ranks of active production. He states in 1867 that the color of the Berkshire in the middle 50's was somewhat similar to that of the present. He also states that as late as 1870 certain crosses of the "small black" (originally the Chinese or Japanese breed) was introduced by certain English breeders to check the appearance of too much white, which had appeared, due no doubt to a white or spotted cross, which had been used at an earlier date. He also believes that this black cross resulted in the modern shortened snout with its acute angle, the black wrinkled nose, and at the same time produced a consistently better crest. T. S. Cooper imported a large number of the best hogs bred by Mr. Swanwick in the early 70's. Quoting from Mr. Humfrey's letter:

"In summing up the evidence of those in England who can speak with authority it is clear that the Berkshire was commencing to assume a separate stock of its own about 1830, and that it continued to thrive with amazing fertility and ever-increasing quality over the next 15 years, when we find it in the hands of many enterprising country gentry, who may be called the earliest pioneers of the breed, since it was in their time that the construction in color was definitely fixed, and bred to, and the type improved. In the next decade from 1860, several other well-known breeders came

into the field. After 1870 many others followed and so on down to the present."

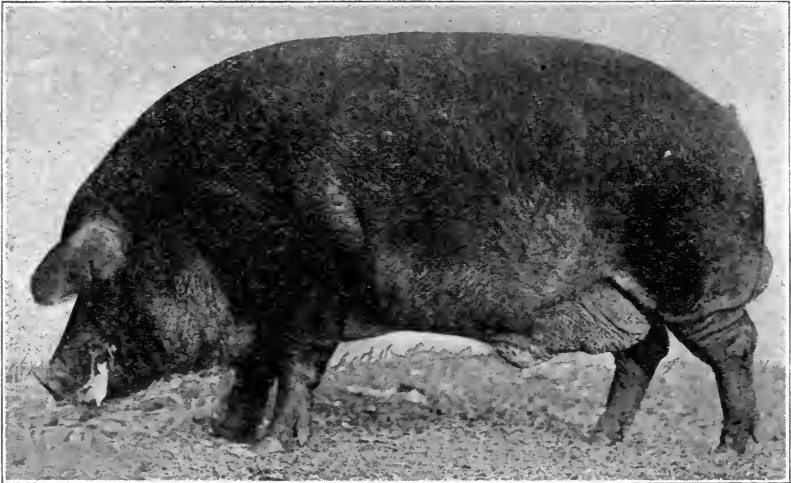
Tribute to the Breed in England.—Mr. Humfrey closes his letter with the following tribute to the accomplishments of the Berkshire in his country: "If I may dwell for a moment on the conspicuous outstanding merit of the Berkshire, apart from its perfect markings, beautiful outline and symmetry of body, it would be in reference to the wonderful way in which it has sustained and improved its fine proportions of fat and lean and good quality of bacon and pork during the past 50 years. For the most convincing evidence of this fact we need only see the results of the competitions, open to any breed or cross, at the great annual Smithfield Show in London. In the live classes since 1883 Berkshires have won the championship 15 times, and it has been awarded 7 times to a Berkshire cross bred. In the carcass classes at the same show, 1904 to 1915, Berkshires won the championship and reserve for same every year. They have also won 40 out of 45 first prizes awarded in 12 years, the classes being open to all breeds. What further proof need we that Berkshires are easily first for quality."

White Berkshires.—How many Americans are aware that white Berkshires were ever imported to this country? I have before me a copy of an agricultural paper published in 1842 at Cincinnati which describes an importation of white Berkshires which were brought into the Miami Valley that year. Portraits of other imported Berkshires of that period indicate that many of them were one-third to one-half white. Undoubtedly, however, these were hogs from Berkshire County, England, and were of strains which entered but slightly into the composition of the present-day Berkshire. It is not unlikely that these white hogs were the forbears of the Suffolks, or perhaps the Yorkshires of today. In Kentucky they have a breed of red hogs which they call Red Berkshires, but the writer has been unable to discover a single authentic record which would indicate that they have anything in common with the ancestry of the Berkshire. The evidence on which I base my opinion as to the purity of the Berkshire as a breed leads me to say that the breed today can boast a longer period of time without the introduction of outbreeding than any breed of swine in existence. A few years ago there was a far wider variation in type than is noticeable today, and it is my opinion that no breed, for the reasons mentioned, possesses the prepotency of the Berkshire.

CHAPTER II

THE DUROC-JERSEY

Accurate information of the origin of the Duroc-Jersey breed does not seem to be of record. It is generally supposed that this breed is strictly American, yet some information available seems to point to the fact that the original stock was imported at an early date. The best information available bears out the statement that originally there were two distinct families of this popular breed



A Grand Champion Duroc Jersey Boar

going under separate names, that of "Jersey Reds" and "Durocs." The name Jersey Red was probably given to this family by Joseph B. Lyman, a resident of New Jersey and an agricultural editor of the New York *Tribune*. Previous to this time the breed had been called Red Hogs. A Mr. Lippincott, of New Jersey was probably the first man to advertise these hogs as Jersey Reds.

History records the fact that in 1832 there were a pair of red pigs shipped from England to New Jersey. Clark Pettis makes this statement. "Their unique color rendered them objects of special interest in a locality long noted for successful swine breeders and feeders, among whom had long existed a great spirit of rivalry as to whom should annually win the honor of raising the best lot of hogs, making the greatest average weight at different ages for which prominent Philadelphia butchers paid advance prices."

The Duroc family were so called by Isaac Frink, of Milton, Saratoga county, New York. Mr. Frink visited the farm of Harry Kel-

sey, of Florida, N. Y., who was the owner of a noted stallion named Duroc. While on this visit Mr. Frink saw a litter of ten red pigs, the production of a pair brought by Mr. Kelsey from Oyster Bay, N. Y., or imported from England. Information available shows that Mr. Kelsey told Mr. Frink they were imported, but it is possible that the term was misused.

Farmers and hog growers were very much impressed with the productive power of these red pigs and they were much sought after, taking the name of Duroc because of the noted stallion owned by Mr. Kelsey. It seems that the Duroc family of red hogs at this time possessed more quality and probably finer bone than the Jersey Red but in the course of time the two families were inter-bred with the result of a larger hog with more quality that seemed to meet with great favor wherever they were known and later on assumed the name of Duroc-Jerseys.

The older breeders and growers of hogs well remember the time when the Duroc-Jersey hog was a curiosity at our larger state fairs. It is well within the memory of many of the breeders who are actively breeding Duroc-Jerseys today that one who would have the nerve to take an exhibit of them to a fair was regarded as being fanatical. The fact remains, however, that these men were not fanatics, but showed genuine judgment in the selection of this breed. We know of one particular locality where some twenty-four years ago a breeder bought a pure-bred Duroc-Jersey sow and began the production of this breed. At that time there was not another Duroc-hog within fourteen miles of this man's farm. Inquiry of the hog buyer at the town where this man lived recently revealed the fact that at the present time 85 per cent of all the hogs shipped from this town to market were solid red. What was done in popularizing the breed in this particular locality has been done in many of the best hog growing districts throughout the United States. Farmers and hog growers never would have taken hold of this breed of hogs and promoted them to the extent they have unless there was genuine merit and feeding qualities to warrant the effort.

In practically all of the leading hog shows throughout the United States the numbers of Duroc-Jerseys are equal to that of any other breed; in many of these shows there are more Duroc-Jerseys shown than any other breed and in some of the leading shows as many as all other breeds combined. The visitor to these fairs will bear out the statement that in these large numbers shown they will find quality in proportion to numbers.

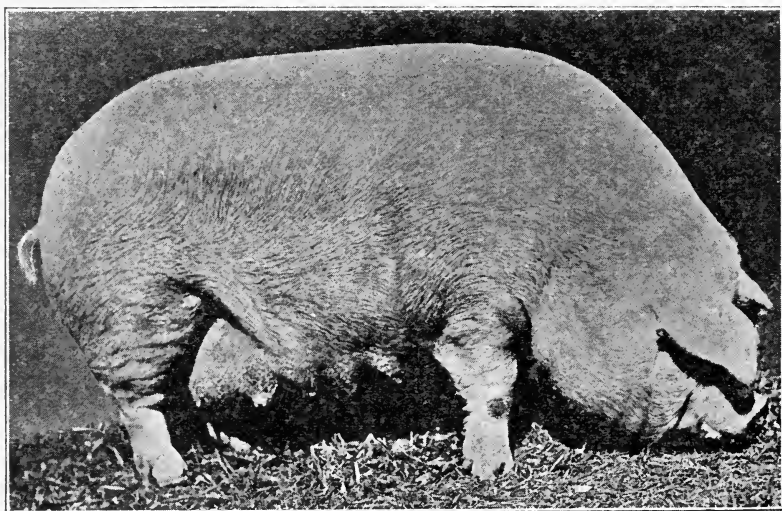
In recent years there are many parts of the United States in which hogs are being successfully grown that a few years ago were not producing any. The popular Duroc-Jersey breed will be found in practically all of these new localities. The farmer and hog grower of today whether he be located in a new locality or an old one recognizes the fact that in order to succeed as he should he must produce the best. In starting his business he gives the matter of breed selection careful attention. The very fact that as we have stated that this careful attention to breed selection has been given

and that Duroc-Jerseys have been found in these localities shows that they are one of the breeds for maximum profit. In the leading barrow shows throughout the United States, Duroc-Jersey barrows are carrying away their full share of the honors. in singles, pens and car-load classes.

CHAPTER III

THE CHESTER WHITE

As the earliest swine writers make no mention of a native American hog, and as the Chester White breed is an American product, it follows that we must look for the source of the origin of the breed to the progeny of swine that were brought over from the European countries by the earliest settlers in America. An analysis of the common stock, as found in New England and Pennsylvania,



A Prize Winning Chester White Sow

early in the nineteenth century, from which stock the breed evidently had its origin, shows that they possessed the characteristics of the early English white breeds, as the Yorkshire, Lincolnshire and Cheshire. Authors agree as to the English origin of the Yorkshire and Lincolnshire, but as to the origin of the Cheshire opinions differ. Be that as it may, the origin of the large white hog as found in Chester Co., Pa., early in the nineteenth century is partly accredited to the blood of the Cheshire hog. These Pennsylvania hogs were white, very large, bony, coarse, muscular and only showed good feeding qualities when matured, or nearly so. Some of them dressed over 1,000 pounds.

Early Improvement.—The first impulse toward the most successful improvement of these large hogs is accredited to Capt. James Jeffries, who introduced a pair of fine white pigs, known as the Woburn, from Bedfordshire, England, and located them on his farm in Chester Co., Pa., in 1818. The Woburn was of the smaller,

compact type, a quick maturing animal, of good disposition and an excellent feeder. The constructive breeders of Chester and Delaware counties, in Pennsylvania soon realized that by crossing Bedfordshire or Woburn hogs on the best white hogs of the county great improvement was made, and by selection and judicious breeding for thirty years a hog was developed that would reproduce its characteristics to such a degree that it became known as a distinct breed, and was named in 1848 "Chester County White," which soon became generally known as "Chester White." It has the distinction of being the first named American-made breed of swine.

A Breeder's Description.—A brief description of these hogs by Paschall Morris of Philadelphia, a breeder of that period, says: "They are generally recognized now as the best breed in this country, coming fully up to the requirements of a farmer's hog, and are rapidly superseding Suffolks, Berkshires and other smaller breeds. The best specimens may be described as long and deep in the carcass, broad and straight in the back, short in the leg, full in the ham, full shoulder, well packed forward, admitting of no neck, very small proportionate head, short nose, dish face, broad between the eyes, moderate ear, thin skin, straight hair, a capacity for great size and to gain a pound per day until they are two years old. Add to these quiet habits and an easy taking on of fat, so as to admit of being slaughtered at almost any age, and we have what is considered in Chester county a carefully-bred animal and what is known elsewhere as a fine specimen of a breed called 'Chester County White.'"

As the different hogs from which the breed was created were all white, or nearly so, its power to transmit a pure white coat on any outcross was the pride of the originators and supporters, and much has been said of the white coat and the pink skin of the early Chester White swine. The Chester White, from its adaptability as a farmer's hog and from its phenomenal winnings wherever shown, became and was acknowledged by writers as the most popular breed in America during the 60's and 70's. This popularity stimulated a most profitable business in breeding; so much so that the breeders who kept their herds pure could not readily supply the demand, and dealers, who saw an opportunity for speculation, bought thousands of mongrel white pigs and sold them as pure-breeds, and the fact that they did not breed true to color and characteristics so menaced the popularity of the breed that it received a back-set that required some time to overcome. Thus the best American breed of hogs that had been created on constructive lines and had made for itself a national popularity by its own merits was doomed to censure by the practices of unscrupulous dealers.

The First Record.—During the time between 1848, when the Chester White hog was named, and 1884, when the first record association for the breed was organized, many of the constructive breeders who were ever loyal to the promotion of the purebreds, and who continued improving the breed along constructive lines from direct ancestors until the breed again had national popularity, saw that in order to have further protection from unscrupulous dealers

it would be necessary to form an association, and to this end E. R. Moody, Eminence, Ky., was instrumental in organizing the first Chester White record association for the breed in 1884. E. B. Ashbridge, Chester Co., Pa., a charter member, who bred them and had the distinction of winning more prizes over all breeds during the 60's and 70's than any other breeder of any breed, bought his first Chester Whites in 1848 from Bennie Hickman, Chester Co., Pa., one of the first few men to whom the creation of the breed is accredited. The animals with which he made these winnings were, like their early ancestors, very large. His herd boar Jim Burns was slaughtered when five years old and dressed over 1,000 pounds. A grandson of this hog, when three years old, was slaughtered and dressed 946 pounds.

The Period ; Numerous Records.—The period of record associations for the breed dates from 1884. Individual efforts made for personal prominence by the handling of animals of the breed brought about quite a number of record associations with different claims for distinction. With the writer's years of breeding and studying the affairs of the breed, he has noticed that the result of the claim made for distinction has not only confused the advocates of the breed but has confused the public as well. From 1884 up to 1913 unity of action for the welfare of the breed was menaced by the activities of seven *record associations catering to the business affairs of the Chester White breed. To the constructive breeders and loyal supporters of the breed is accredited the maintenance of the merits of the breed from its creation up to 1907, when the first unity of action was manifested in promoting the breed by placing the Standard Chester White Record on such a financial basis as would support universal breed promotion. A growing sentiment to "boost" the breed as it should be was made possible by launching of the "*White Breeders' Companion*" in 1910, which is now known as "*The Chester White Journal*."

Merging Associations.—With the improved methods and purpose of the Standard record and the help of the "*Companion*" in showing the advantages of greater unity in co-operation, the American Chester White Record consolidated with the Standard Chester White Record in 1913, thereby creating the Chester White Swine Record Association, which the National O. I. C. Chester White Record Association joined in March, 1915. To the progressive breeders is ascribed the progress of the breed. They have brought about great improvement in individuality, and uniformity in type and size. They have bred a heavier coat of hair, which enables the breed to stand the climate in all countries much better than the original Chester White. The feet and legs are straighter, with bigger bone; backs are broader and stronger; the sides are deeper and the head and face are neater. All of these improvements have been made, yet the merits of the breed and its prolificacy have been maintained.

*Note: An analysis of the record associations and the claims made for distinction can be obtained by writing to the Chester White Swine Record Association, Rochester, Indiana.

A Heavy Breed.—The Chester White is classed as a large breed of the lard type. Specimens of the ancestors of the breed dressed over 1,000 pounds. In fact, specimens in any period of the breed's history have dressed 1,000 pounds. While the breed has the capacity for making large hogs, a table of the average weights of the animals shown at the National Swine Show, Omaha, Nebraska, in October, 1917, may be of interest:

15 aged boars	averaged 744 lbs.—heaviest one 915 lbs.
7 senior year boars	averaged 572 lbs.—heaviest one 710 lbs.
15 junior year boars	averaged 583 lbs.—heaviest one 720 lbs.
26 senior year boars	averaged 404 lbs.—heaviest one 460 lbs.
20 aged sows	averaged 586 lbs.—heaviest one 690 lbs.
9 senior year sows	averaged 551 lbs.—heaviest one 630 lbs.
18 junior year sows	averaged 501 lbs.—heaviest one 530 lbs.
23 senior sow pigs	averaged 401 lbs.—heaviest one 415 lbs.

A well-known swine writer in his report of this breed at the National Swine Show says: "As to uniformity of size for age the Chester White breed is unexcelled." With this reputation and with the winnings that this type of Chester White has made in the barrow shows and carcass contests, it is the opinion of the writer that it might be a mistake to standardize an average weight very much higher than is shown above. The Chester White is easily acclimated and contented under different conditions; is a good grasser a clean dresser and a profitable cutter; is prolific and raises a large percent of a big litter, and can be fitted for the packer's market at any age. The finished product, or the carcass of the Chester White and its crosses, has an unparalleled record of winnings at the International Live Stock Exposition in Chicago. The standard of type for the breed, as formerly used, was revised by representative members of the Chester White Swine Record Association and the O. I. C. Swine Breeders' Association in 1913, and it is the official score card for the breed and is so recognized by the American Association of Expert Judges of Swine.

The Record Associations for the breed universally recognized are the Chester White Swine Record Association, Rochester, Indiana, the O. I. C. Swine Breeders' Association, Goshen, Indiana, and the National Chester White Record, West Chester, Pennsylvania.

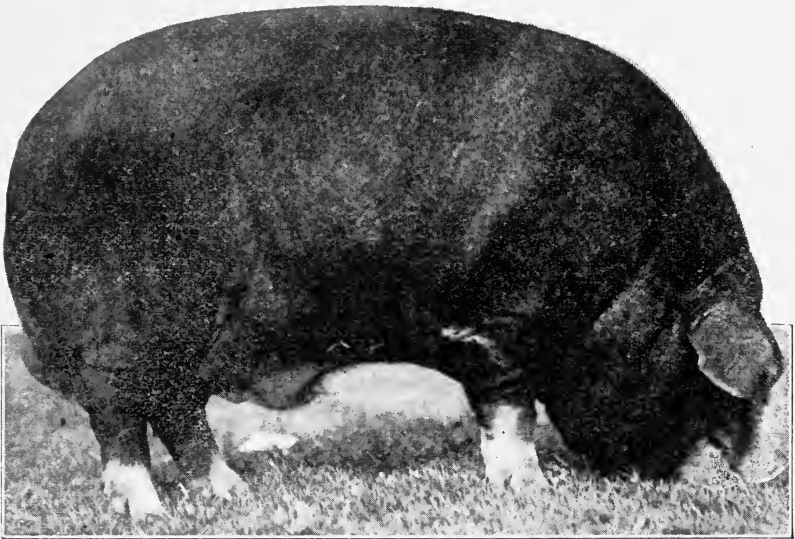
CHAPTER IV

THE POLAND CHINA

By WM. M. McFADDEN

Secretary of the American Poland-China Record Association

In the early part of the nineteenth century, prior to the development of the great Middle West, where grain production and animal husbandry now largely obtain, the necessity was keenly felt for a meat-producing animal which could not only condense the rich grain, chiefly corn, and carry it to market, but consume large



A Grand Champion Poland China Boar

quantities in short order, and be got to market as speedily as possible, once the grain was ready to feed. In the absence of pure-bred hogs or records, a body of farmers and feeders in southwestern Ohio set about designing a type of hog suited to American requirements, selecting, modeling, developing and perfecting various sorts obtainable. They continued this cause until 1877, when a record was established, and the Poland-China became the acknowledged "cornbelt type," the great Middle West being known as the corn and hog belt, later styled the corn, hog and clover belt. These Ohio farmers sought a type of hog that could make the best use of corn, because corn was abundant, and the most bulky crop to market as raw product.

Developed and perfected, therefore, under American environment, by undoubtedly the most competent and skilful men who ever engaged in a like enterprise, whose ideas were both original and constructive, and whose primary object was superior feeding and fattening ability, coupled with vigor, size and rapidity of growth, the essentials, the prime requisites of economical production and packing quality, were pre-eminently established, and grounded in the breed in its inception, regardless of minor considerations of color, markings and points of finish or fancy.

To the fact that the two prime factors—disposition easily to fatten at any age, and to make rapid and immense growth—were staunchly maintained against those divisions having to do with the outward appearance or beauty, is due, beyond question, the present superiority of the breed, and this fact is also accountable for its universal popularity.

The geographical origin of the Poland-China was the Miami Valley, Butler Co., O., and the origin of the breed dates back to early in the nineteenth century. Previously to 1816 two breeds of hogs were generally known in this valley: the Russian or Russia and the Byfield. These were generally bred, and their blood mingled with common hogs of the community.

In 1816 a boar and three sows, known as the Big China, were brought into the valley by the Shakers' society, whose members had much to do with the development of the Poland-China breed. Used on the Russian and Byfield crosses, the Big China produced superior feeders, and much improved the character of the Miami Valley hogs, resulting in what became widely known as the Warren County hog.

Between 1816 and 1835 the swine industry of southwestern Ohio had a great impetus, due to the beneficial effects of this cross. In 1839 a hog called the Irish Grazier was brought into the county, and was one of the main factors in the perfecting of the Warren County hog.

The Warren County hog had the distinction of being hardy, vigorous, prolific, and much larger than hogs of any of the other common breeds. After 1839 no outside blood was brought into the county, according to the claim made of men in a position to know the facts. Breeders of swine in this valley became "thoroughly assured that they had the elements, the basis of a good breed of hogs, and that by judicious, discriminating breeding they could produce and establish a breed that would meet the demands of the country." At the National Swine Breeders' Convention in Indianapolis, Ind., in November, 1872, a committee, authorized to investigate the origin of the breed, made a report, recommending the name "Poland-China," which was adopted. The report continues:

"This breed has been thoroughly established. For more than thirty-five years it has been continuously improving without the

introduction of any new blood. It possesses unquestioned good qualities, and can be relied upon for the production of a progeny of like good points and qualities. The prominent characteristics of the Poland-China are as follows:

“Hogs of good length, with short legs, broad, straight backs, great depth of body, flanking well down, very broad, full, square hams and shoulders, drooping ears; short heads, wide between eyes; of spotted or dark color. They are hardy, vigorous and prolific, and when fat are perfect models, pre-eminently combining the excellencies of both the larger and smaller breeds.”

All of what could properly be said about the breed in 1872 can still be said, and much more. The addition of some degree of size has been one of the most popular improvements among farmers. Added bone, substance, and the holding of all the desirable elements of prolificacy and broodiness are some of the things that have served to keep the breed as the best model for successful pork production.

The claim that the Poland-China is the only strictly American breed was questioned by a number of persons interested in other breeds. But close study and careful thought in regard to the matter has resulted in a general acceptance of the correctness of the statement. The consideration of this matter has served to bring out some striking facts, quite favorable to the breed, which had not previously had the attention which their importance deserved.

The Poland-China was distinctly the result of the constructive breeding ideas of cornbelt farmers. Breeds of all colors and many different forms and characteristics were used in connection with the common hogs of the cornbelt country to produce the Poland-China. In no predominating degree did the breed owe its form, conformation and easy feeding qualities to importations, nor to any one of the numerous breeds and kinds of hogs used in making the Poland-China.

The breed was not fashioned after any hog ever seen in the world before. It had new qualities, new possibilities, a new form, and was not only a new hog, but pre-eminently the result of the environments of the American cornbelt. In short, the breed was distinctly entitled to that slogan which now bids fair to become so popular, “Made in America.”

Many significant things have happened during the last few years to emphasize the growth of the Poland-China business in new territory, and the popularity of the breed. Only a few years ago the territory east of the Mississippi, and south of the Ohio, was smothered under a bacon type blanket. All this has completely changed, and the number of purebred Poland-Chinas in this section is many times what it was a dozen years ago, and the breed has assumed a commanding position, where formerly it made an indifferent showing. Remarkable progress has been made in the

Pacific Coast country in the breeding of Poland-Chinas, and all of the great northwest portion of the United States. Poland-China breeders in this section are aggressive, and imbued with unbounded faith in the breed.

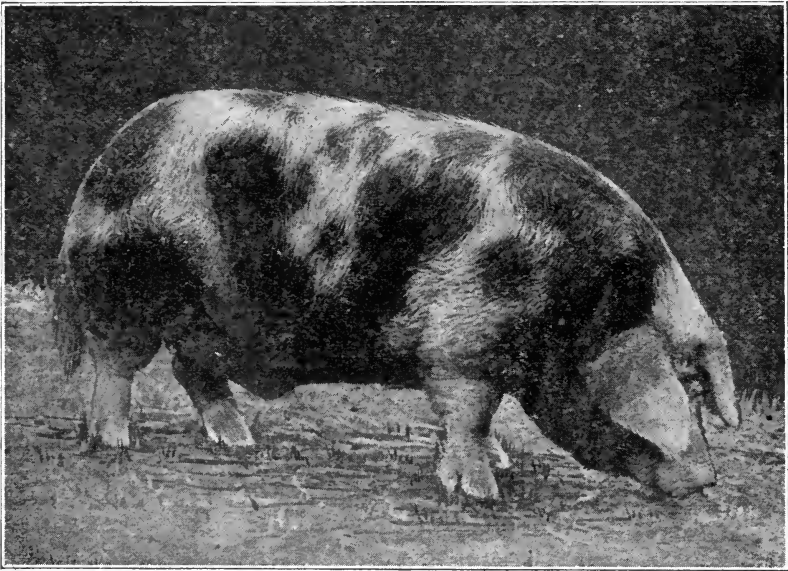
The wide dissemination of the breed in the great northwest country of Canada, extending from Manitoba to the Pacific Coast, has marked the most notable epoch in the way of breed extension, which the Poland-China has ever seen, outside the so-called cornbelt. The increase in popularity of the breed has doubtless been greatly assisted by the large number of cornbelt farmers who have settled in that territory. It is noticeable, however, that the quick growth and easy-feeding qualities of the breed have commanded favorable attention from a great many people in this section who were formerly bacon hog advocates.

The number of Poland-Chinas being recorded at present is greater than ever before. The introduction of the breed into new territory is making astonishing progress. In addition to this, there is unmistakable evidence that the cornbelt farmer, after having tried some experiment in breed or type, or having noted the results of such experiments, has it more firmly fixed in his mind than at any former time that no breed of hogs has in its makeup so many of the essential elements of profitable pork production as the Poland-China.

The first breed fashioned and developed in America, as a strictly American breed, to meet cornbelt conditions, the Poland-China is today better prepared than any other breed to serve as a pork-making machine. Unexcelled for prolificacy, unequaled for size with quality, and size for age, unapproached for adaptability to average farm conditions, the popularity of the Poland-China is for these reasons on a foundation of such real stability and tested merit that the recent remarkable increase in business is easily accounted for. No breed of hogs offers a more inviting field in which to obtain sure and satisfactory results in return for intelligent and painstaking efforts.

THE SPOTTED POLAND CHINA

The Spotted Poland-China breed claims its origin is identical with all other Poland-Chinas. They originated from an amalgamation of from five to seven mongrel breeds, beginning about 1830. The first record association of the Poland-China breed, the old Central, bears out this statement, as its first volume contains photographs and descriptions in about 1877 of black hogs, spotted hogs,



THE SPOTTED POLAND CHINA

189

and white hogs from the same litter. Many Poland-Chinas at that time were white, spotted and black. We maintain that through color prejudices the white hogs and spotted ones were discriminated against to such an extent that they were almost extinct by 1910; but a few breeders held out for spotted hogs, and in 1914 an association was formed in Indianapolis for a record from that time on for the spotted ones, and they were to be known as the Spotted Poland-China.

Many of the hogs included in the National Spotted Poland-China Record Association are eligible in the black Poland-China records also, while others were picked up in 1914 and recorded as foundation animals.

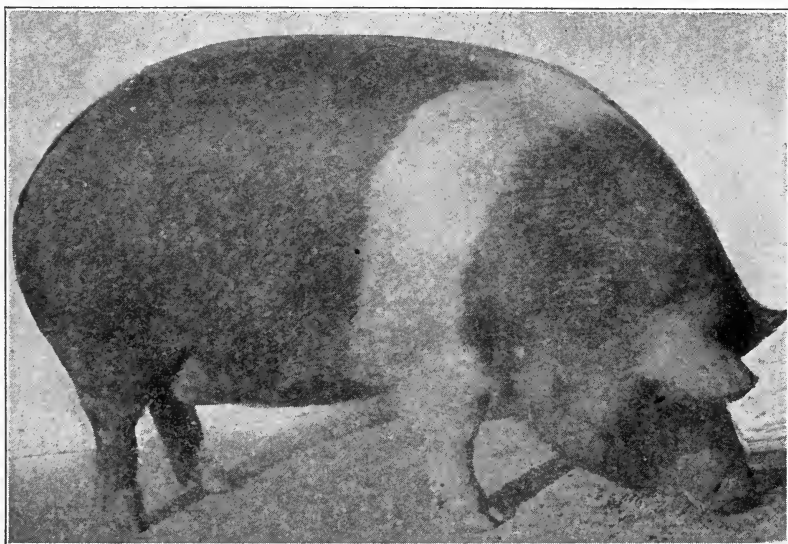
"We do not claim a perfect animal in type or color at this time, but we do claim to be making an honest effort to improve our hogs, and to breed them as near a given standard, both as to individuals and as to color, as possible. We are trying to develop a hog of good length, a nice spring of ribs, a smooth coat, and marked about 40 per cent white and nicely spotted, and we want just as large a

hog as possible to maintain its feeding qualities. We are enjoying a splendid demand in every section of the United States for the Spotted Poland-Chinas. We have now recorded about 7,000 head, have 954 members, and I think practically every state in the union is represented. We had classes in at least fourteen state fairs in 1918. We are strongly inclined to believe that there is no better breed than ours, but the kind of hog to breed is the kind one likes best. Success with every breed depends on the efforts of the man raising the hogs.

CHAPTER VI

HAMPSHIRE

The Hampshire hog of today is a combination type being adapted for both bacon and lard. The breed is of English origin and according to Mr. H. F. Work, at one time secretary of the breed record association, the Hampshire traces to pigs brought to Massachusetts from Hampshire, England, about 1820. Descendants of this importation were taken to Kentucky about 1825, and for a



A Typical Hampshire

number of years were kept pure and became popular with hog breeders in Kentucky, Illinois, Ohio, and Indiana, but eventually became so mixed with other breeds that it was hard to find a pure bred Hampshire.

In the early 70's, there were several herds along the Ohio River, known as Thin-Rinds, which continued to exist until the American Hampshire Swine Record Association was established in Boone County, Kentucky, in 1893. This association by active work began to improve and popularize the breed, and in 1904, the name "Hampshire" was officially adopted for the breed.

The Hampshire hog has made good records in the dressed carcass contests and the barrow shows at the International Live Stock Expositions and other national shows. It is held in high esteem by

the packers, and its flesh carries a high percentage of lean, and is generally fine grained. The breed gives good satisfaction in early maturity and feeding qualities and is a good grazer. It is active, hardy, and adaptable to almost any climate.

During the past few years, there has no breed made greater progress than has the Hampshire in development of individuality and in the distribution of the breed, as they are now found in large numbers in most of the states as well as becoming popular in Canada.

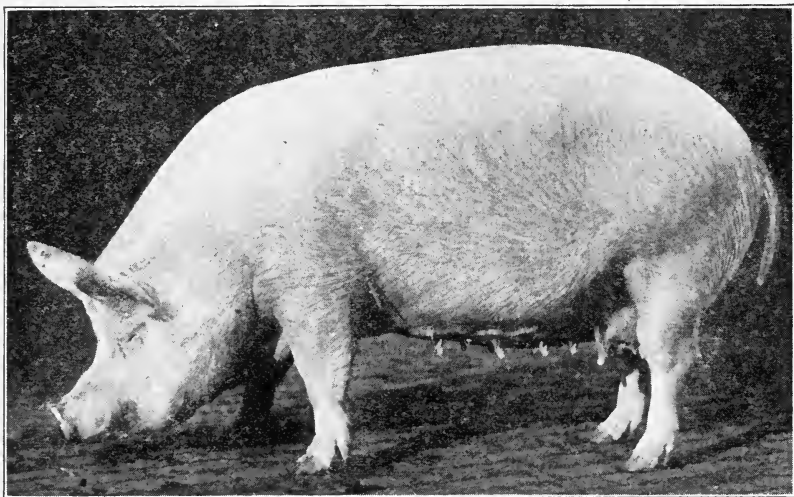
According to the standard of excellence adopted by the American Hampshire Swine Record Association, the ideal Hampshire has a head of a medium length, rather narrow, cheeks not full, face nearly straight, and medium width between the eyes. The eyes are bright and lively, and free from wrinkles or fat surroundings. The ear is medium, although thin, and slightly inclined outward and forward. The neck is short and well set to the shoulders; the back is straight or slightly arched, medium breadth with nearly uniform thickness from shoulder to ham, and full at the loin. The sides are full, smooth and firm. The hams are of medium width and long and deep. The legs are medium length, set well apart, and squarely under the body. The coat is fine, straight, and smooth. The animal is black with the exception of a white belt encircling the body, including the fore legs. The disposition of the Hampshire is docile, quiet, and easily handled.

CHAPTER VII

YORKSHIRES

The Yorkshire, as its name might signify, was originated in England and is descended from large, coarse boned, leggy white hogs which were common in Yorkshire and other nearby counties for many years. The exact origin of the breed is unknown.

Three distinct types of Yorkshires are bred: the Large, Middle, and Small Yorkshire. The Yorkshire is strictly a bacon type hog,



A Typical Yorkshire Sow, "Bacon Type"

and is used with splendid success in crossing on smaller types.

The first authentic report of an importation of Yorkshires to the United States was in 1892. The headquarters for the breed is in Minnesota with representative herds in many sections of the United States.

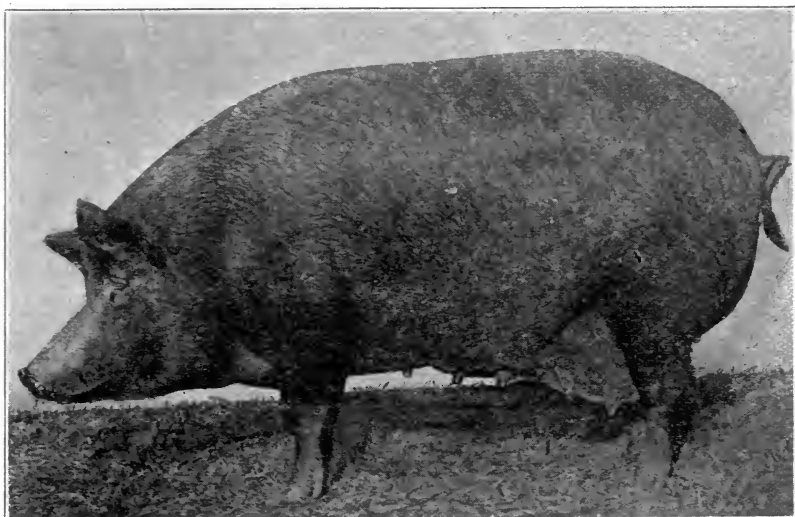
In Canada the breed has progressed much farther than in this country, and is one of the most popular and most numerous breeds found there today.

The Yorkshire is pure white in color. Black hairs disqualify, but black or blue spots on the skin do not, although it is the aim of the breeder to reduce these skin spots as far as possible. A large proportion of lean to fat, and great length of side makes the Yorkshire particularly desirable as a bacon producing animal. To produce a very fat carcass at an early age, the Large Yorkshire is not the ideal type. It is a special-purpose breed, and that purpose is to produce bacon, and as a bacon producing animal it is held in very high regard.

CHAPTER VIII

THE TAMWORTH

The Tamworth is one of the oldest breeds of improved swine, there being no out-crossing for more than 100 years. About or prior to 1812 Sir Robert Peel, then secretary for the English Crown to Ireland, brought from Ireland to his own estate in England, at a place called Tamworth, a breed of swine, probably descendants of the Irish Grazier. Sir Robert was much interested in improvement



A "Bacon Type" Tamworth Sow

of domestic animals, and kept this breed of swine pure and without an outcross to the time of his death in 1850, and the breed became known from that time on as Tamworth.

In the first volume of the National Pig Breeders' Association herd book of Great Britain, published in 1885, we find four Tamworths recorded,—two sows and two boars,—Ruby 272, bred by Lord Hastings, East Dereham, Norfolk; Sanda, 274, bred by Mrs. Jos. Norman, Tamworth, England; Rufus, 261, bred by Lord Hastings; Sampson, 263, bred by Thos. Watson, Coleshill, England.

In Vol. XI of the English herd book, 1895, is found the first published standard of excellence. It is practically the same as is in use today. The Tamworth was practically red in color, with occasionally some black spots, these spots, however, denoting no impurity of blood. It is objectionable merely as a fancy point, and today very few black spots are seen.

The second volume of the Canadian Swine Breeders' Record, published in 1893, has the first recording of Tamworths in America, imported in 1889 by John Bell L'Amoroux, Ont., Canada. The breed became very popular throughout Canada, and the writer at one time while visiting the Toronto Exposition, the great Canadian fair, saw more Tamworths on exhibition than any other one breed of swine. How long previously to this if any there were Tamworths in Canada the writer has been unable to ascertain.

We find in 1881 Thos. Bennett, Rossville, Ill., imported from England some purebred Tamworths. Since this introduction into the United States the Tamworth has been slowly making gains. The appearance of the animal has been against it, and much unjust criticism, both through intent and ignorance, has been cast upon the breed.

Chief Characteristics.—For decades before the introduction of bacon hogs the American people had become fixed admirers of the lard types with their rather short, thick, plump, smooth bodies and short heads, necks and limbs. The Tamworth conformation inclined to the opposite type. The wide divergence from appearance standpoint has undoubtedly militated against them, even in the face of logical reasoning from an economic standpoint. The Tamworths, contrary to the opinion of some, are docile, tractable animals, responding, as all animals do, to the character of the treatment accorded them. The Tamworth is possessed in an unexcelled degree of the qualities of good motherhood, including ease of conception, large litters, abundant milk supply and attentiveness to young. It is particularly well adapted for the purposes of cross-breeding in the production of intermediate types.

The Tamworth is pre-eminently a bacon hog. The dressed carcass may be cut up on the local dealer's block, and retailed with little labor and expense in converting the by-products into marketable goods. The Tamworth produces a maximum amount of bacon from its long, lean, deep sides, which are not unduly covered with fat. The hams and shoulders, being devoid of an excess of fat, meet with favor on the market.

From the standpoint of economic production there is no reliable data on record to prove that it costs more to produce a given weight with the bacon than the lard type of hogs. A number of comparative tests have been made by several institutions, and the results go to show that the Tamworth is capable of holding its own.

Standing of the Breed.—The following data were collected by Geo. M. Rommel of the United States Bureau of Animal Industry, and published in Bulletin No. 47 of the Department of Agriculture. Experiments were made with six breeds, at eight different experiment stations, with reference to the number of pounds of feed consumed to make 100 pounds of gain. It appears that the Tamworth is capable of holding its own with the best of the breeds.

Breed	No. of Tests	Total No. of Pigs	Feed for 100 lbs. Grain
Tamworth.....	16	92	344 lbs.
Chester White	13	71	347 "
Poland-China	22	96	357 "
Berkshire.....	28	121	369 "
Large Yorkshire.....	11	67	407 "
Duroc-Jersey.....	11	66	418 "

As a range hog none can surpass the Tamworth; in fact, it has not been found wanting in any place, north, south, east or west. Tamworth sows are great mothers, producing as a rule large litters and raising them. The percentage of loss very small. To show the tendency to prolificacy the following will illustrate: One sow in eighteen months farrowed 57 pigs, and raises 50 of them; another in a twelve-month farrowed 42 and raised 40 of them.

The Tamworth will weigh well at any age, but to get full growth and weight, which occasionally reaches over 1,000 pounds in sows and 1,200 to 1,300 pounds in males, the time required to reach maturity may be a little longer than with some of the other breeds; but how long it would take the others to reach these weights we do not attempt to say. It is reported from an authority that a Tamworth was killed in England some years ago that weighed alive 1,607 and dressed 1,330 pounds. This without doubt establishes the heavy-weight record for swine. Amber King 1705, sold by W. Warren Morton of Kentucky to the John Robinson Circus, weighed 1,400 pounds, and was shown as "the largest hog in the world."

Record Association.—The American Tamworth Swine Record Association was organized in 1897. It is the only record association of the breed in the United States, and the only exclusively Tamworth record association in the world. No apology is due either the bacon hog for his looks or the owner for his choice. The most typical of all bacon hogs, the Tamworth is as much a distinct type of hog as the horse is of the equine family. Purebred bacon hogs should never be confounded with the lean, unthrifty and half-finished, half-starved type of hog of all breeds or no breed at all, brought to market and offered as bacon hogs. Neither should the breadth of his ears, the length of snout or of leg be made a matter of comparison with freaks of other breeds. The undisputed merit of the Tamworth, together with the kindly spirit of his breeder, is rapidly extending his acquaintanceship, and he is here to conquer conditions as he finds them. We find in all lines of endeavor that there are some who are aggressive, and push their business. It is so in the breeding of purebred stock, and too many engaged in the business leave all the push and publicity to the few, and they sit quietly by and indirectly get the benefit at the expense of the hustler. Let each breeder stand up for the advantages of his particular breed, and the value of the PUREBRED over the scrub. All our improvement in the industry has come through the purebred, the pedigreed animal. Purebreds make most economical gains,

mature at an early age, are more uniform in shape, color, and quality, hence are worth more for market purposes than scrubs. Purebred sires are a necessity.

It is true that there are pedigree scrubs, but these are to be discarded. No breeder who wishes to build up a permanent business and a good reputation should breed from inferior animals, or sell their produce for breeding purposes. The price asked for purebred animals should be sufficient to guarantee to the purchaser that he will get valuable animals, typical of the breed. Too many purchasers want to buy cheap. Don't cater to that kind of trade.

In the swine industry let there be a higher standard of excellence for pedigree stock, a more general appreciation of its value among breeders, and then a means of impressing this value on intending purchasers. We must have confidence in our business, else we cannot inspire others with confidence. More and more is confidence in breeders becoming apparent, and those who have or will achieve success must be honest and have the confidence of the public. A sale made by mail should be as satisfactory as by personal inspection of the herd by the would-be purchaser. That inspires confidence in the business.

Breed for a purpose, have an ideal and strive to attain it. The breeder who aims at nothing in particular usually hits the mark. Nowhere is the goal of him who follows anywhere. Breed and feed improve live stock for profit. Breed improved live stock for the pleasure there is in it. Breed improved live stock to hand a legacy to posterity, something of value that will show that you have been a benefactor to your community while engaged in a livelihood, and perhaps carved for yourself a name that will be carried into history. The true breeder does not lose sight of the fact that any improvement made in breeding has been done to improve the animal rather than to wander to speculative values. While improvement goes on, the ideal must be kept in mind, no matter what the commercial value of the animal. Those who have stood "pat," those who looked into the future and guessed it would be good, have not been disappointed; they are reaping their reward.

CHAPTER IX

THE MULEFOOT

By JOHN H. DUNLAP,

President, American Mulefoot Hog Breeders' Association

Aristotle, who was born in 384 B. C., wrote of a race of hogs with undivided toes or consolidated hoofs. Later Linaeus, the Swedish naturalist, born in 1707, wrote that hogs with undivided toes were not uncommon about his native town in Sweden. This hog has been known to naturalists in different parts of the world for more than 2,000 years. With all of this line of ancestry, the Mulefoot is a stranger to the great rank and file of hog breeders today. Just as the hut builders of South Africa used the blue mud from the diamond vein to daub his house, overlooking the immense wealth carried in each hod, so have the hog breeders overlooked the great value of the Mulefoot. It is a real diamond which was neglected in the rough, but brought to perfection has surpassed the fondest hopes of the most enthusiastic.

The bottom of the foot of these hogs is soft and padlike, similar to the pads on animals of the cat family. This would indicate that they must have been a flesh-eating animal at one time, and nature provided them with pads to enable them to prey on other animals. They seem to be the same as other hogs except for their feet, yet I find their intestines are smaller. This gives them a larger dressing percentage.

This breed gets its name from its solid foot, which is solid like that of a horse or mule. The flesh is of a remarkably fine flavor. There are a great many ideas held about its origin, but this as well as the tendency of the purebred Mulefoot to assert itself with a solid foot when crossed with other breeds, is still puzzling the scientists.

My attention was called to this breed by a letter from Mr. Quinn of the United States Department of Agriculture. It seems that the Government has never been able to find out where or how this breed got its solid foot. Claims are made by many who purchased Mulefoot of me that compared with other breeds they are hardier, have greater vitality, mature earlier, and cost less to make the first 250 pounds. The sows are gentle, kind mothers, are usually very prolific, raising large litters, which if turned out will hustle for their living, or grow and thrive, paying big returns under good care and attention. They claim the pigs are hardier and freer from pig diseases than pigs of other breeds, and are great rovers, hustling for themselves from time of birth. The sows are better sucklers than those of any other breed I have ever had under observation. They seem to have a great capacity to produce milk while suckling pigs and the sows are harder to keep in high flesh, but as soon as their litters are weaned the gain in flesh is very

rapid. As a breeder of Mulefoot, I am now taking pains to cross the different families, and to have a hog equal to any breed. While the Mulefoots have been inbred to a certain extent, they attain to weights equal to those of Poland-Chinas or Duroc Jerseys, and can easily attain to individual weights of 600 to 800 pounds. The color of the Mulefoots is usually black, sometimes black with white spots.

CHAPTER X

OTHER BREEDS OF HOGS

In addition to the standard breeds of hogs which are most numerous in the United States, there are other minor breeds, a number of which have only local distribution. Others have in the past been more or less popular but have lost popular favor because of deterioration in the breed or some other reason. These minor breeds are: Essex, Victorias, Cheshires, Suffolk, Large Black Pig, and Middle White. None of these breeds are raised to any extent in the United States.

The Essex originated in Essex County, England, and belongs to the small breeds, being much smaller than the present day popular breeds. It is all black in color, smooth and compact of body. The Improved Essex was imported into the United States in large numbers at one time, but practically no Essex have been brought into this country during later years. The Essex is quick maturing and easy fleshing, but its lack of size prevents it from becoming popular with the farmer.

The Victoria is a medium sized hog, with a rather short snout, dished face, erect ear, and white in color. The breed was originated about 1870 by Geo. F. Davis, Dyer, Ind., and was formed by combining the blood of the Berkshire, Chester White, Suffolk, and Poland-China. Although a breed known as the Victoria was originated in 1850 by Col. F. D. Curtis of New York, the breed is not generally recognized as a distinct breed and is not widely known.

The Cheshire breed was originated in Jefferson County, N. Y., about 1855. Some believe that Cheshire is simply a derivative of the Yorkshires, as Yorkshires were brought into Jefferson County and crossed with white pigs of that neighborhood. It is also believed that Suffolk blood was used in breeding up the Cheshire. The Cheshire is a white medium sized breed with slightly dished face, small erect ear, fine bone, with well developed shoulders and hams. The breed has made very slow progress and is practically unknown outside of the United States.

The Suffolk is a small breed, with dished face, small and very short snout, erect ears, and a thick short body, set up on very short fine boned legs. The hair is of a pale yellowish white color. This breed is of the same origin as the small Yorkshire. There is no such breed as the White Suffolk recognized in England, but the name is sometimes applied locally to the Small Black breed, of which the Essex is a representative. The breed has practically disappeared in Canada and is found only in small numbers in the Mississippi Valley in the United States.

The Large Black Pig, as its name would signify, is solid black and of large proportions, one of the characteristics being a very

large drooping ear. It is somewhat on the order of the bacon type. The origin of the breed is not known, although it has been bred for many years in England. This breed is hardly known outside of England and is bred only locally there.

The Middle White is in reality a cross between the Large White and the Small White, although it is recognized in England as a distinct breed. Some of the breed might pass as the Large White and others, the Small. The Middle White is practically unknown in this country, although a few have been imported into America during the past few years.

CHAPTER XI

FARMERS MEAT SHOWS

During the last few years exhibits of country-cured meat have become quite common throughout the United States, especially in the Central and Southern portions where the curing of hams after the old-time recipes has reached the highest degree of perfection.

Of all the states in the Union, Missouri was the first to put on a Farmers' Ham and Bacon Show under state auspices. In January, 1913, at which time we were serving as assistant secretary of the Missouri State Board of Agriculture, we, with the approval of that body, inaugurated the pioneer farmers' meat show. Two factors prompted us to put on such a show. We wanted to get the consumer acquainted with the outstanding merits of country-cured meat, and we desired also to interest more farmers in the making of meat that would be a distinct credit to the country. So the show was both an exhibit and a school. Our idea was, and still is, that the farmer is of all men the best fitted to instruct and interest others in meat making—or, to put it in Missouri parlance, to "show 'em."

The first exhibit, held in the Missouri College of Agriculture buildings, brought out a few very excellent pieces of country-cured meat, especially hams, but in the main the exhibits were sadly lacking in attractiveness and uniformity. Generally speaking, the quality was good, and the men who knew of the merits of country ham eagerly bought all that were for sale at the conclusion of the show. At the same time the city consumer, accustomed to the attractively put up packing house product, was wont to turn up his nose at the country-cured ham—that is unless his nose caught the appetizing aroma of said ham. In this event it was different. To taste this ham was ever after to want one.

At this first show some effort was made to establish a sort of score card or standard of excellence for hams. A tentative score card for the judging of hams was suggested as follows; Size and form—weight (10 to 18 pounds) 5; trim, 10; symmetry, 5; total, 20. Cure and quality—flavor, 50; color, 10; texture, 10; proportion of fat to lean, 5; marbling, 5; total, 80; grand total, 100.

Not only was the second Missouri farmers' ham and bacon show larger than the first, but the quality and uniformity of the meat was superior. The improvement of trim and general appearance of hams was especially noticeable where the exhibitors had made entries in the first show. The third annual exhibit represented a long step forward. Clearly, both the management and the exhibitors were learning a noteworthy change in the better display of meat in the showroom. This included more and clearer classifications, with rack and shelving arrangements calculated to

bring out more prominently the educational side of the show. For instance, after the hams had been cut for the inspection of the judges, they were not piled in a heap but by the use of proper racks, provided with shelving, the parts of the ham were kept together so that the entire piece of meat might be seen at a glance. This arrangement made it easy for the public to compare the outside appearance of the ham with the appearance after it had been cut.

In the third annual Missouri show the prize list was as follows: Best home-cured country ham, \$25; second, \$15; third, \$10. Home-cured country bacon—first, \$25; second, \$15; third, \$10. Home-cured country shoulders—first, \$12.50; second, \$7.50. Fresh country sausage, first \$10, and second, \$5.00. Smoked or fancy country sausage, first, \$10, and second, \$5.00. In later shows separate classifications were provided for cured sausage and for fancy sausage. This is advisable. Green hams are not exhibited. Hams must have been made eight months or more. This rule should not apply to shoulders or bacon. Here only sufficient cure to preserve is all that is required.

In conducting a farmers' meat show it is important that the announcement concerning it be made in ample time and that this announcement be couched in the plainest and most simple language. The premium list and terms governing the exhibit should be clearly defined. All meat should be received at the show room in time to be entered and placed for exhibit before the opening of the show. When received, each piece should be weighed and tagged with a number corresponding to the entry number in the superintendent's book. All entries should be confined strictly to farm-made meat. In the Missouri show the rule has been to return all meat at exhibitor's expense at the close of the contest or to sell meat at market price and remit this.

In conducting a meat show, one difficulty is to secure competent judges, men who know good country-cured meat and who know how to make it. If there are up-to-date farmers who have given considerable thought to this question and who have established reputations for the quality of their smoke-house products, they will perhaps be the best judges. Many good judges of fresh meat lack the qualifications for judging the country-cured product.

It is important that the showroom be neat and clean as this will make the exhibits appear to better advantage. Winners of prizes should be required to furnish, if possible, the recipes by which meat was cured. Other information, such as breed of hog, age and weight, from which meat came is desirable.

If at first there was doubt as to the value or practicability of a farmers' ham and bacon show, these misgivings have been removed. At such shows, in Missouri and in many other states which have fallen in line, there is now seen the real country ham, brown as a berry, sweet and savory, and with white fat and red lean, making altogether a most appetizing product. The bacon, too, is of the best, "crisp, juicy savory," with the much sought "streak o' fat and streak o' lean" splendidly sandwiched. Such an exhibit ban-

ishes forever from the city man's mind the idea that a country ham is a long-shanked piece of meat apparently trimmed with an axe, the superabundance of fat being yellow, and the smell, as it comes from a dirty sack, a vivid reminder of rancid lard. Nor will this connoisseur from the city longer think of country bacon as a piece of very salty "pale complexioned side meat". The only dissatisfaction that will exist in the mind of the would-be consumer will result from his inability to satisfy his appetite.

Farmers' meat shows should not be limited to State and Federal support. Swine breeders' associations everywhere should back up the movement. Agricultural associations and farm clubs generally may well take the lead. The war has taught many that they can temporarily do with less meat. Hence, it is doubly important that, now that peace has again come, that the truth that nothing can, after all, permanently take the place of meat, be impressed on the purchasing public. Most of all, the farmer needs to know that he can make better meat for his own use than he can buy, and at the same time the cost is less. The after-the-war period should bring about the revival of the country smoke-house. If it is worth while for the lemon growers and the raisin growers of California to spend hundreds of thousands of dollars in exploiting their goods it is no less important that the swine growers of America advertise their products.

CHAPTER XII

THE NATIONAL SWINE GROWERS' ASSOCIATION

By MERRITT S. McFADDEN

The devastating and long to be remembered foot-and-mouth scourge which secured a footing in America in 1914 was the indirect cause of the formation of the National Swine Growers' Association. It has long been the custom for breeders of purebred swine to look forward to their annual meetings during the International Live Stock Exposition in Chicago, the first week in December. The prevalence of the foot-and-mouth disease in 1914 made it necessary to abandon the International that year, thus removing the attraction that had made possible representative gatherings of the devotees of the several breeds. It was to counteract this loss and to offer an attraction that would bring forth representative gatherings that the Illinois Swine Breeders' Association in 1914 sent forth an invitation to the swine breeders of America to attend a meeting of their organization in Chicago on Dec. 2, 1914, the prime object being the formation of a National association of swine growers.

At the time this step was taken J. Young Caldwell, Williams-ville, Ill., was president of the Illinois Swine Breeders' Association, and Charles A. Marker, of Auburn, L. E. Frost, then of Springfield, W. M. McFadden of Chicago, R. J. Evans of Chicago, L. E. Troeger of Chicago, E. C. Stone of Peoria, W. S. Corsa of Whitehall, W. J. Carmichael of the University of Illinois and others took an active and prominent part in crystallizing the idea of a National Swine Growers' Association.

Accordingly on the date set more than one hundred representative swine breeders of all breeds and from all sections of the country sat at dinner at the Fort Dearborn Hotel in Chicago. Opinions and suggestions were offered by nearly all of the leaders of the swine business of that day who were in attendance. The unanimity of opinion and the broadness of the spirit of those present resulted in the organization of the present National Swine Growers' Association. Wm. M. McFadden presided as chairman of that meeting. A. C. Halliwell, at that time editor of "The Chicago Daily Live Stock World," was elected president, J. L. Thatcher, Davenport, Ia., vice-president, L. E. Troeger of Chicago, secretary, and Geo. M. Cantrall, also of Chicago, treasurer. All of these officers were elected by acclamation. The executive committee selected at this meeting constituted a representative from each of the various breeds, and the personnel was as follows: For Hampshires, E. C. Stone, Peoria, Ill.; for Berkshires, W. S. Corsa, Whitehall, Ill.; for Duroc-Jerseys, J. Young Caldwell, Williams-ville, Ill.; for Poland-Chinas, J. E. Meharry, Tolono, Ill.; for Tam-

worths, Frank Thornber, Carthage, Ill.; for Large Yorkshires, Thomas H. Canfield, Lake Park, Minn.; for Mulefoots, John H. Dunlap, Williamsport, O.; for Chester Whites, Fred H. Moore, Rochester, Ind.

The activities of the first year were directed by men who gave liberally of their own time to the service of the association, and no mean amount of progress was made in placing the association on a plane that commended it to the attention of the nation's live stock husbandmen. Plans for a National Swine Show, suggested and commended upon at various times during the year, failed to result in the establishment of such a show, owing to the prevalence of the foot-and-mouth disease. The interest in the association, however, continued, and when the annual dinner was called at the Fort Dearborn Hotel on Dec. 1, 1915, notwithstanding the fact that the International Live Stock Exposition had again been cancelled, the attendance numbered well above two hundred breeders from many parts of America, and represented all of the breeds of swine. The idea of the National Swine Show crystallized at this meeting, and definite plans were inaugurated, looking to the establishment of such a show during 1916. Secretary W. M. McFadden of the American Poland-China Record Association was elected president of the association, with J. Young Caldwell, Williamsville, Ill., vice-president, James J. Doty, Shenandoah, Ia., secretary, and George M. Cantrall, Chicago, treasurer. The personnel of the executive committee was, for Poland-Chinas, H. L. Currie, Brownsville, Tenn.; for Duroc-Jerseys, Charles V. Truax, Sycamore, O.; for Hampshires, E. C. Stone, Peoria, Ill.; for Spotted Poland-Chinas, Mrs. Jennie M. Conrad, Conrad, Ind.; for Mulefoots, John H. Dunlap, Williamsport, O.; for Berkshires, W. S. Corsa, Whitehall, Ill.; for Large Yorkshires, Thomas H. Canfield, White Bear Lake, Minn.; for Chester Whites, C. R. Doty, Charleston, Ill.

The enthusiasm that prevailed at the meeting indicated that it was the definite intention of the swinememen to support the association, using it as the official voice of America's swine interests. The year that followed the meeting found the association active in its efforts to secure more uniform and better quarantine regulations, disease eradication methods and many other improvements in swine husbandry conditions, and to the development of a national show of purebred swine.

In January, 1916, announcement was made of the selection of the site for the National Swine Show. Omaha was chosen as the location, after competition with Waterloo and Des Moines, Ia., Dallas, Tex., Atlanta, Ga., Memphis, Tenn., and Shreveport, La. The inducements offered by the Nebraska city were such as to offer every likelihood of a successful initial show, which proved to be the case, when the show closed on Oct. 7. Upwards of 1,400 hogs were on exhibition, and the character and excellence of the exhibits were such as to bring forth the highest praise from the country's live stock press. The judging in the various breeds was ably done, and the standards there established have become the standards for

the breeds in all of the shows, with a resulting harmony of effort that has advanced the purebred industry and the showing to a plane that neither had ever before enjoyed.

The annual meeting of the association in 1916 was held at the Fort Dearborn Hotel in Chicago on Dec. 4. Two hundred and thirty-nine sat at dinner that evening. There is no question that there had never previously been so large or representative a gathering of men interested in America's swine husbandry, and all were enthusiastic over the accomplishments of the association, especially over the initial National Swine Show. The discussions of the evening outlined many of the fields of endeavor for the association in broadening the swine industry. It was at this meeting that the suggestion was first publicly made for the employment of a man to devote his entire time to the interests of swinememen—an idea that crystallized twelve months later.

The officers in 1916 were unanimously chosen to continue their duties through 1917, thus leaving in office President W. M. McFadden, Vice-President J. Young Caldwell, Secretary James J. Doty and Treasurer George M. Cantrall. The 1917 executive committee was selected as follows: For Poland-Chinas, H. Wade Gillis, Mt. Pleasant, Ia.; for Duroc-Jerseys, W. H. VanMeter, Williamsville, Ill.; for Berkshires, C. F. Curtiss, Ames, Ia.; for Chester Whites, Fred H. Moore, Rochester, Ind.; for Hampshires, Willie Essig, Tipton, Ind.; for Spotted Poland-Chinas, Fred L. Obenchain, Bainbridge, Ind.; for Mulefoots, John H. Dunlap, Williamsport, O.; for Tamworths, J. B. Mackoy, Farrugut, Ia.; for Large Yorkshires, B. F. Davidson, Menlo, Ia.

The Association early announced that the National Swine Show for 1917 would be held in the same quarters as the event in 1916, with such additions as might be required. The dates were set as Oct. 3-10, inclusive, thus including a Sunday in the middle of the show week—a move made to bring out a large attendance of town-folk on that day. The idea did not bring the desired result, however, and was abandoned the following year. In July the show committee—W. M. McFadden, L. E. Frost and E. C. Stone—met with the various recording association secretaries, and compiled the rules that were to govern the show in 1917, and the report of that meeting was widely published. A students' judging contest was planned at this meeting, and N. M. Gordon of Chicago was made chairman of the committee in charge, his co-workers being Ray Davis and R. L. ("Bob") Hill. Subsequently this event proved to be one of the real features of the show.

The stage for the second national was well set, and the number of entries exceeded those of 1916 by over a hundred head and the quality, uniformity and type of the animals presented offered eloquent evidence of the influence of the show of the preceding year. There was far less divergence in type and a considerably greater uniformity in the pens that year, and the judging was again of the kind more firmly to set the best standards of breed development. The attendance at the show was a disappointment to the officials although the earlier days showed a sharp advance over the figures

for the previous year. Doubtless the cold weather of the closing days was largely responsible for the decrease. It was a fact worthy of note, however, that there was a larger number of breeders present from a distance, and many of the best animals were sold by exhibitors to these men.

Gifford Pinchot of the United States Food Administration was a visitor at the show, and a meeting of the swinemen was held in the Exchange Building in Omaha during the week to consider with him the best means to be employed to bring about an increase in the amount of pork produced in 1918. Members of the association attended the meeting in large numbers, and resolutions were adopted designed to offer the proper stimulus to pork production. The debate on the subject was spirited, and the unity of the hogmen to aid the Government in bringing the desired results was marked. There is no question that that meeting largely of the National Swine Growers' Association membership, was an important cog in the machinery that was employed to assure an adequate production of pork in 1918.

In the winter of 1917 the importance of the association had come to be so widely appreciated that it was no longer possible to hold the annual meeting in the quarters previously used for that purpose. Therefore the meeting was arranged for the Morrison Hotel in Chicago on Monday night of the International show week. The healthy condition of the organization was evidenced by the balance of \$2,199 in the treasury and by the large increase in membership during the year. It was at this meeting that the subject of securing a salaried secretary for the association was brought to a head by the assurance of various pledges of financial support. The record associations and various publications evidenced a desire to be counted in on the program for supporting such an office, and the selection of a man was delegated to the executive committee. This committee was selected as follows: For Duroc-Jerseys, W. H. Van-Meter, Williamsville, Ill.; for Poland-Chinas, Chas. A. Marker, Auburn, Ill.; for Chester Whites, Fred H. Moore, Rochester, Ind.; for Berkshires, E. J. Barker, Thorntown, Ind.; for Hampshires, E. C. Stone, Peoria, Ill.; for Tamworths, J. B. Mackoy, Farragut, Ia.; for Spotted Poland-Chinas, John Bock, Kempton, Ind.; for Large Yorkshires, B. F. Davidson, Menlo, Ia.; for Mulefoots, Robert E. Pfeiffer, Columbus, O. W. M. McFadden was elected president of the association for the third successive term, Robt. J. Evans of Chicago, vice-president, E. Z. Russell, Omaha, Neb., secretary, and George M. Cantrall, Chicago, treasurer.

Early in 1918 a meeting of the executive committee was held in Peoria, Ill., at which various proposals were heard for the location of the 1918 National Swine Show, and at the same time a considerable amount of discussion was indulged in relative to the selection of a permanent salaried secretary for the organization. No definite decision was reached in either instance at this meeting, but subsequently announcement was made of the selection of Cedar Rapids as the site of the 1918 show, and a month later ratification

of the selection of John T. Stinson for the office of permanent secretary was announced. The selection of Cedar Rapids for the show came as a considerable surprise, but centering the show as it did in the heart of one of the greatest swine producing areas the announcement was well received, and interest in the event took an early impetus.

Mr. Stinson located his office at Cedar Rapids, and at once busied himself with campaigns for the securing of memberships in the association. A great deal of missionary work was done to find the most effective methods of securing members, and the results of the efforts were considerable, though the natural reticence of farmers to organize themselves has been apparent throughout the building of the association. The secretary's office kept the members well posted on the happenings in swinedom and was particularly effective in giving authentic reports of all movements of the Food Administration looking toward a realization of the necessary increase in pork production. In this regard E. Z. Russell, who resigned as secretary in favor of Mr. Stinson, gave valuable service as the special representative of the association in Washington. Mr. Russell was in charge of the swine promotion work of the Bureau of Animal Industry of the Federal Department of Agriculture and, working with the National Swine Growers' Association, his efforts have been effective in making possible the work the association has accomplished.

Unquestionably the greatest of the three swine shows was that held at Cedar Rapids Sept. 30 to Oct. 5, 1918. The new location found a community alive to the importance of swine husbandry in American agriculture, and the attendance greatly exceeded that of either of the previous events. In fact, the attendance practically equalled the combined attendance of the first and second shows. An inadequate conception of the magnitude of the show on the part of those responsible for its conduct resulted in a rather inadequate preparation for the event, with some discomfort and inconvenience to exhibitors. Neither can it truthfully be said that the judging equaled that of previous years in all breeds, though as a whole criticism in this regard was mild, and the type and standard of breed perfection was not impaired by the decisions made. Hogs of seven breeds were exhibited at this show, both the Large Yorkshires and Tamworths having classifications. A notable part of the show was the exposition feature promoted by Secretary Stinson, which included a corn, ham and bacon show, machinery and equipment, as well as other accessories of interest and entertainment that were cordially received by the visitors.

At the annual meeting of the association on Dec. 2, 1918, at the Hotel Sherman in Chicago, the annual dinner was dispensed with, owing to the press of business to be transacted. Upwards of two hundred members were present, and it was obvious that the interest in the association had become so great that the special feature of a dinner was unnecessary to attract them. Officers and members alike viewed the activities of the year 1918 as most encouraging, and the outlook for future as bright. Among the accomplishments of

the association that were viewed with particular regard was the activity of the officers in regard to the fixing of the minimum price for hogs in conjunction with the Food Administration, the lifting of embargo and express shipments of hogs during December, the successful conduct of the swine show, the progress made in securing uniform shipping regulations for the various states and other features.

A talk by Geo. M. Rommel, Chief of the Bureau of Animal Industry, enlightened the members on the live stock conditions of the old world, as observed by him on a trip made with a commission sent to investigate. L. H. Stubbs of the Chamber of Commerce at Cedar Rapids also made a talk, in which he explained the reasons for the shortcomings of the swine show accommodations for 1918, and promised the members that Cedar Rapids had learned its lesson well and was prepared to correct all mistakes at the show of 1919. The following officers were unanimously elected: President, Robt. J. Evans, Chicago; Vice-president, Fred H. Moore, Rochester, Ind.; Treasurer, Geo. M. Cantrall, Chicago. Executive Committee: For Poland-Chinas, Chas. A. Marker, Auburn, Ill.; for Duroc-Jerseys, W. M. Putman, Tecumseh, Neb.; for Chester Whites, L. C. Reese, Prescott, Ia.; for Hampshires, Clayton Messenger, Keswick, Ia.; for Large Yorkshires, B. F. Davidson, Menlo, Ia.; for Tamworths, P. O. Morris, Aledo, Ill.; for Berkshires, Ralph M. Jenkins, Orleans, Ind.; for Mulefoots, John H. Dunlap, Williamsport, O.; for Spotted Poland-Chinas, John H. Bock, Kempton, Ind. The selection of the secretary was left to the executive committee, under whose official direction he was placed.

Subsequently the committee selected W. J. Carmichael, formerly of the Animal Husbandry Department of the University of Illinois, and for several months previously to his appointment, associated with E. Z. Russell as a specialist in swine husbandry promotion by the United States Bureau of Animal Industry in Washington. Mr. Carmichael selected an office in the Old Colony Building, Chicago, as his headquarters, and is taking an active part in live stock activities of the country in behalf of swinemen.

The Swine Growers' Association has made progress toward realizing a powerful organization, working for the betterment of men engaged in the production of swine. Organization is coming to be more and more recognized by farmers as a means of accomplishing things. Various associations of farmers and farmers' interests are springing up, and their effect is coming to be more and more noticeable. The National Swine Growers' Association has arrived at a place in its development that promises that it shall become one of the most powerful organizations of the country devoted to such a course. Membership in it is a mark of progress and alertness, and farmers and breeders are taking advantage of it irrespective of breeds or whether they are breeders of purebreds or growers of pork.

GESTATION TABLE

Showing the date when a sow is due to farrow, counting sixteen weeks from the day when she was served. Find the date when the sow was served, and the date immediately to the right is the date when she is due. For instance, if the sow was served February 1, she is due May 24; if served May 24, she is due September 13.

Feb.	May	Sept.	Jan.	April	Aug.	Dec.	Mar.	July	Nov.	Feb.	June	Oct.	Jan.
1	24	13	3	25	15	5	27	17	6	26	18	8	28
2	25	14	4	26	16	6	28	18	7	27	19	9	29
3	26	15	5	27	17	7	29	19	8	28	20	10	30
4	27	16	6	28	18	8	30	20	9	Mar. 1	21	11	31 Feb.
5	28	17	7	29	19	9	31 April 1	21	10	2	22	12	1
6	29	18	8	30 May 1	20	10	1	22	11	3	23	13	2
7	30	19	9	1	21	11	2	23	12	4	24	14	3
8	31 June 1	20	10	2	22	12	3	24	13	5	25	15	4
9	1	21	11	3	23	13	4	25	14	6	26	16	5
10	2	22	12	4	24	14	5	26	15	7	27	17	6
11	3	23	13	5	25	15	6	27	16	8	28	18	7
12	4	24	14	6	26	16	7	28	17	9	29	19	8
13	5	25	15	7	27	17	8	29	18	10	30 July 1	20	9
14	6	26	16	8	28	18	9	30	19	11	1	21	10
15	7	27	17	9	29	19	10	31 Aug. 1	20	12	2	22	11
16	8	28	18	10	30	20	11	1	21	13	3	23	12
17	9	29	19	11	31 Sept. 1	21	12	2	22	14	4	24	13
18	10	30 Oct. 1	20	12	1	22	13	3	23	15	5	25	14
19	11	1	21	13	2	23	14	4	24	16	6	26	15
20	12	2	22	14	3	24	15	5	25	17	7	27	16
21	13	3	23	15	4	25	16	6	26	18	8	28	17
22	14	4	24	16	5	26	17	7	27	19	9	29	18
23	15	5	25	17	6	27	18	8	28	20	10	30	19
24	16	6	26	18	7	28	19	9	29	21	11	31 Nov.	20
25	17	7	27	19	8	29	20	10	30 Dec. 1	22	12	1	21
26	18	8	28	20	9	30	21	11	1	23	13	2	22
27	19	9	29	21	10	31 Jan. 1	22	12	2	24	14	3	23
28	20	10	30	22	11	1	23	13	3	25	15	4	24
	21	11	31	23	12	2	24	14	4	26	16	5	25

INDEX

	Page		Page
Advertising.....	80	Emmer.....	151
Ages, Authenticating.....	70	Energy Builders.....	108
Alfalfa, Feed Saved By Use of.....	123	Essex.....	199
Alfalfa Hay.....	163	Exercise on Show Circuit.....	67
Alfalfa Pasture.....	121		
Alfalfa, Protein in.....	122	Farmers' Meat Shows.....	201
Antiscorbutic Substances Seemingly Necessary.....	108	Farrowing Time.....	34
Arrival of Pig.....	76	Fishmeal.....	157
		Feeding for Market.....	52
Barley.....	145	Feeding on Circuit.....	68
Beans.....	161	Feeds and Feeding.....	54
Berkshire History.....	173	Feeds, Basal.....	113
Blood Lines, Study.....	78	Feed House and Feeding Pens for Swine (Ground Plan).....	15
Bloodmeal.....	158	Feeds, Composition.....	113
Bluegrass.....	127	Feeds, Condimental.....	164
Breeding, Age, Time and Season for.....	32	Feeds, Miscellaneous.....	114
Breeding Crates, Use of.....	32	Feeds, Miscellaneous.....	164
Breeding Pigs, Ration for.....	116	Feed Saved by Using Alfalfa.....	123
Breeding Season.....	32	Feeds, Supplementary.....	153
Brood Sow, Care of.....	36	Forage Crop Mixture.....	7
Brood Sows, Selecting.....	29	Forage Crops, Selecting.....	121
Brood Sow, Feed of.....	36	Forage Crops, Why Grow.....	120
Buttermilk.....	154	Free Choice System, Beginning of..	168
Canker Sore Mouth.....	98	Garbage.....	164
Carbohydrate Equivalent.....	112	Gluten Feed.....	161
Castrating.....	101	Grains, Hard Should Be Ground....	109
Catalogues for Herd.....	81	Grazing, Heavy Ill Advised.....	122
Cereals, Efficient Use of.....	110	Green Feed.....	55
Charcoal or Slack Coal.....	139	Green Rye, Effects of.....	129
Cheshire.....	199		
Chester White History.....	180	Hair, Clipping.....	66
Chute for Loading Hogs.....	10	Hair, The Coat of.....	30
Cob Charcoal, How to Make.....	58	Ham and Egg Lunch Loaf.....	85
Concrete Dipping Tank.....	50	Ham Balls.....	85
Condiments.....	64	Ham, Baked.....	84
Cooking Feed.....	56	Ham, Boiled.....	84
Corn, A Healthful Feed.....	135	Ham, Boneless Boiled.....	85
Corn, A Substitute for.....	149	Ham, Delicious Fried with Eggs....	85
Corn and Alfalfa.....	136	Hampshires.....	190
Corn and Cobmeal.....	143	Head Cheese.....	84
Corn and Other Feeds.....	144	Herd Boar, The.....	26
Corn Oil Cakemeal.....	162	Herd Boar, Handling the.....	27
Corn or Indian-Maize Grain.....	135	Hog Cholera and Serum.....	88
Corn, Preparation for Hogs.....	140	Hog Farm, Location.....	9
Corn, Soft.....	144	Hogging Down Corn.....	54
Correspondence.....	78	Hog House, Community Half Moni- tor Roof Type.....	22
Cottonseed Meal.....	161	Hog Houses, Movable; Types Built at Iowa State College.....	16
Cowpeas.....	130	Hog House, Myers Plan.....	12
Crops to Feed Green.....	57	Hog Wallow, A Convenient and Sanitary.....	45
Cross Breeding.....	48	Hominy Feed.....	149
Curing Hams, A Recipe for.....	86	Housecleaning.....	58
Curing Thick White Fat Pork.....	86		
Diseases, Common.....	95		
Dressing.....	67		
Duroc Jersey.....	177		

	Page		Page
Immunizing a Business Policy.....	93	Self-Feeding, Does It Pay?.....	166
Inbreeding.....	48	Self-Feeding Don'ts.....	172
Ingredients, Basic.....	118	Self-Feeders on Pasture.....	167
Judging at Shows.....	72	Selecting a Boar for Common Sows	51
Lard, Home Made.....	86	Serum, Preparation of.....	90
Large Black Hog.....	199	Shade, Natural or Artificial.....	19
Limestone.....	136	Show Herd, Feeding the.....	64
Line-Breeding.....	48	Show Herd, Handling in the Ring..	65
Linseed Oilmeal.....	157	Show Herd, Exercise Necessary....	65
Marking.....	39	Show Herd, Fitting the.....	63
Marketing, Six Months Before.....	47	Show Herd, Finishing Touches.....	66
Meatmeal Tankage.....	156	Show Herd, Selection and Fitting of	62
Medium Red Clover.....	126	Showing, Advantages of.....	60
Middle White.....	199	Shipment, Preparation of Pig for...	75
Mulefoot.....	197	Shipping Crates.....	74
National Swine Growers' Associa-		Sire, Importance of Good.....	23
tion, The.....	204	Sire's Influence.....	24
Oats, Common Field.....	129	Skimmilk.....	153
Oats.....	159	Skin Diseases.....	100
Oatmeal, Hull-less.....	160	Soiling.....	57
Overfeeding, Ill-Effects of.....	52	Sore Feet.....	98
Pasture, Importance of Good.....	18	Sore Mouths.....	97
Pastures, Miscellaneous.....	128	Sore Teats.....	100
Pasture, Mixed.....	130	Sorghums.....	148
Pastures, on Low Protein.....	132	Sow, Type to Select.....	29
Pastures, on High Protein.....	130	Soy Beans.....	129
Peanuts.....	152	Soy Bean Meal.....	158
Peanut Meal.....	159	Spaying.....	101
Pedigrees.....	78	Speltz.....	151
Pigs' Feet, Boneless.....	84	Spotted Poland China.....	188
Pigs' Feet Souse.....	84	Stationery.....	81
Pig Meal.....	58	Sterility.....	98
Pigs, Care of.....	44	Suffolk.....	199
Plant Leaves Balance Rations.....	111	Sulphur.....	139
Pleuro-Pneumonia.....	97	Summary and Suggestions.....	170
Poland China, The.....	184	Sweet Clover.....	128
Pork, Home Cured.....	83	Swine House, A Complete.....	12
Porkmaking Profitable.....	53	System.....	79
Potatoes.....	151	Tamworth.....	193
Precautions, Sanitary.....	45	Thumps in Young Pigs.....	96
Protein Another Essential.....	106	Treatment of Show Herd On It's	
Rack for Feeding Alfalfa.....	59	Return Home.....	58
Rape, Analysis of.....	124	Uniformity, Value of.....	53
Rape.....	124	Victoria.....	199
Ration, A Complete.....	104	Vitamines, Certain Needed.....	197
Ration, How to Balance.....	105	Watering, System of.....	21
Ration, Successful for Economical		Water, Necessity of Plenty of Pure.	21
Dry-lot Feeding.....	132	Water, The Function of.....	105
Ration, To Balance a.....	115	Weaning Pigs.....	38
Rheumatism.....	99	Weight for Age.....	47
Rock Phosphate.....	137	What a Breeder of Full Breds Should	
Roots.....	164	Be.....	77
Record Card.....	42	Wheat.....	146
Record of Litters.....	39	Wheat Bran.....	161
Rye.....	147	Wheat Middlings.....	160
Salt.....	137	Winter Quarters, In.....	8
Salt Pork, Fried.....	84	Winter Wheat.....	129
Sausage, Home Made.....	86	Wood Ashes.....	137
		Worms.....	95
		Yorkshires.....	192



AN INITIAL FINE OF 25 CENTS

OCT 28 1940
NOV 22 1946

LD 21-100m-7,'40 (6936s)

YC 20518

1 10119

UNIVERSITY OF CALIFORNIA LIBRARY

